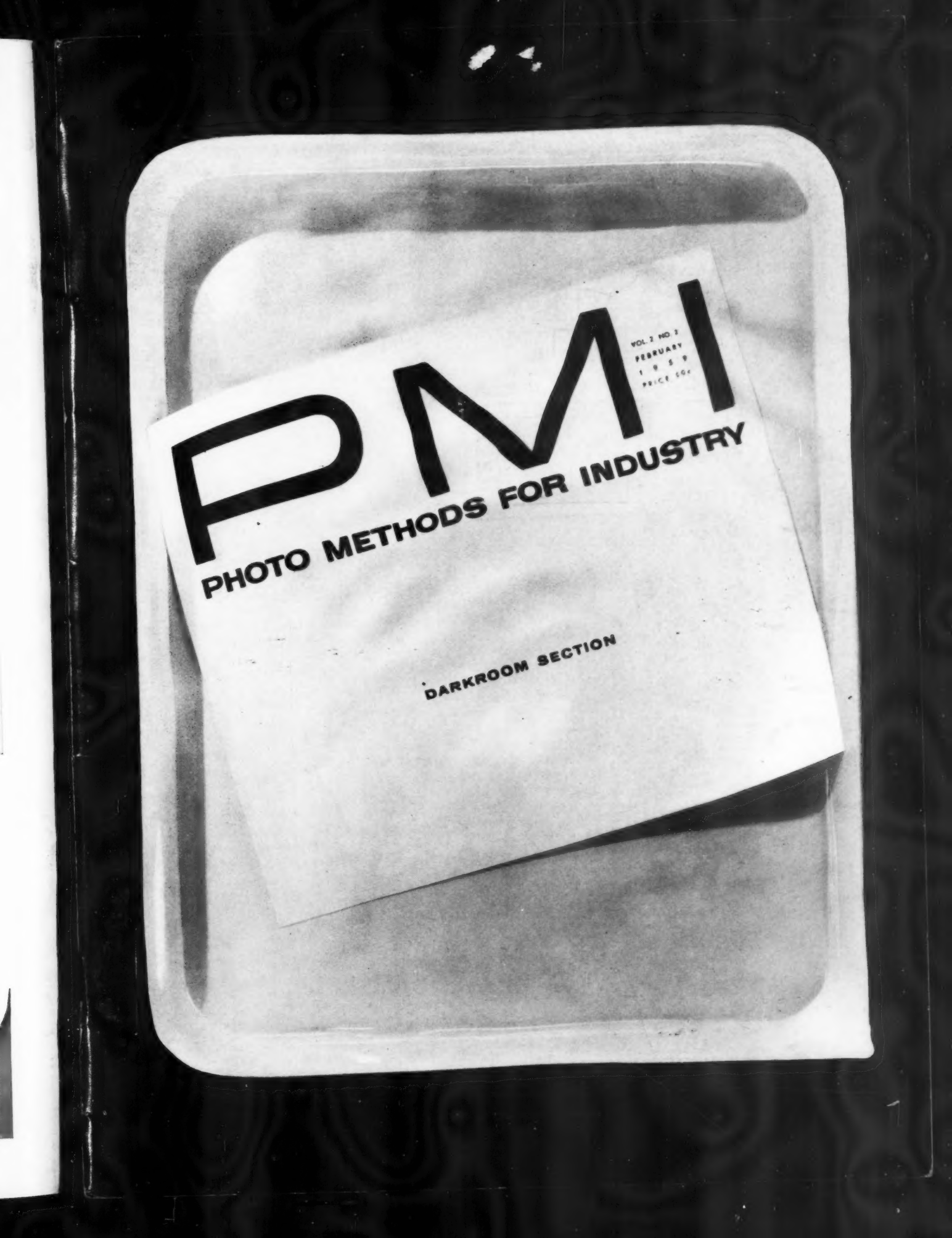
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VOL. 2 NO. 2
FEBRUARY
1959
PRICE 50¢
PHOTO METHODS FOR INDUSTRY
DARKROOM SECTION

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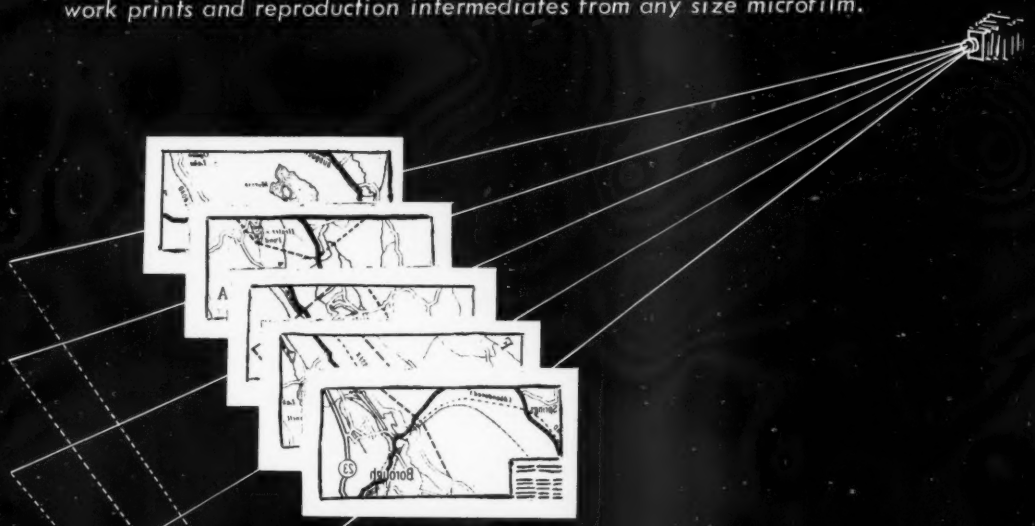

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Get more information. Circle 403, page 65

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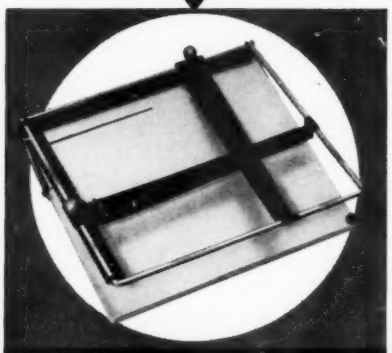

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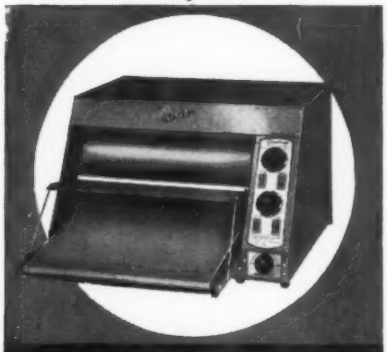
Get more information. Circle 409, page 65

Beseler Dryer Model 1217K



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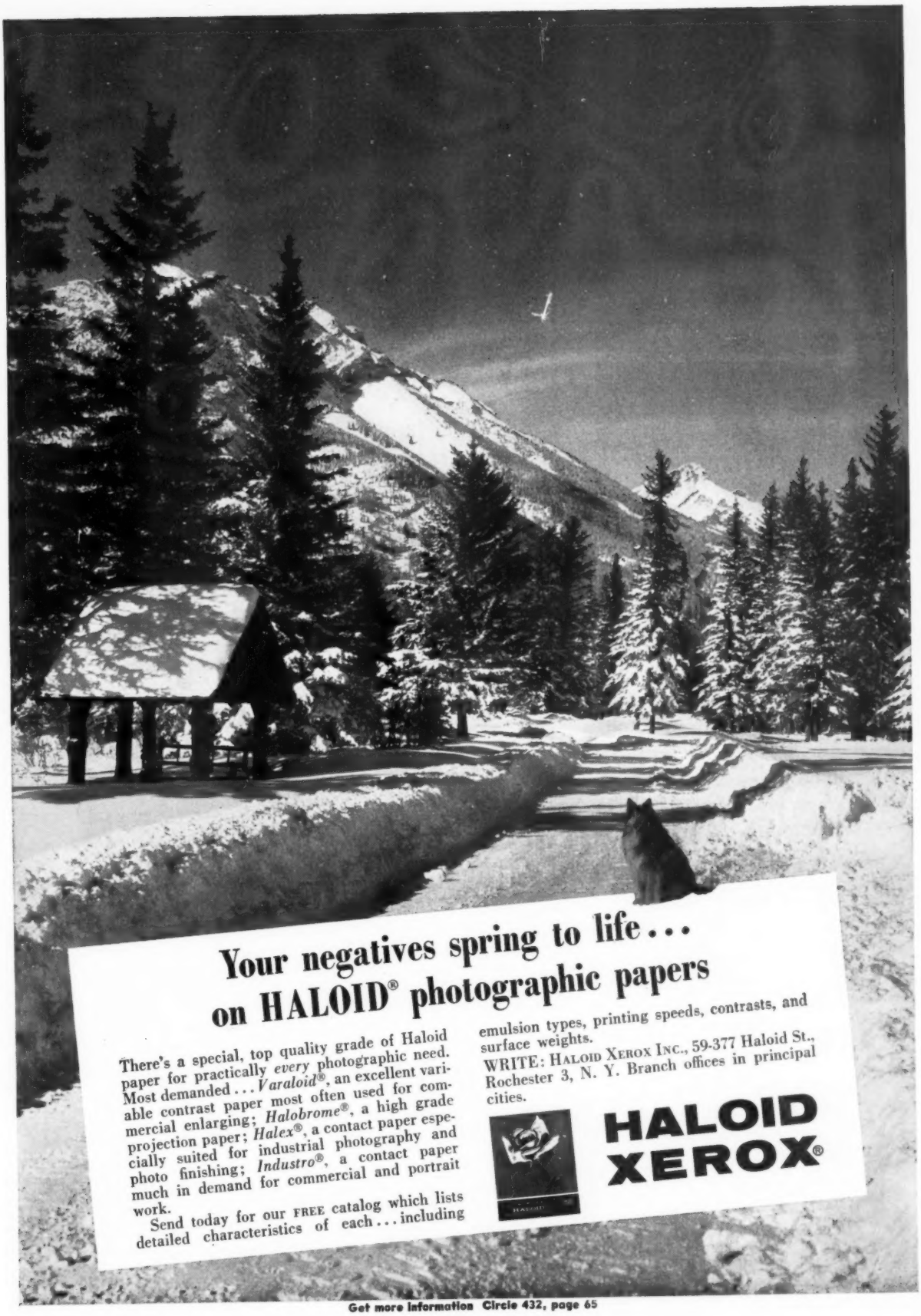

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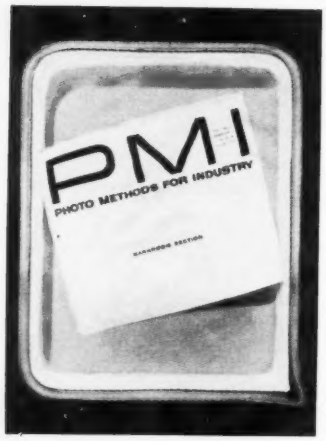

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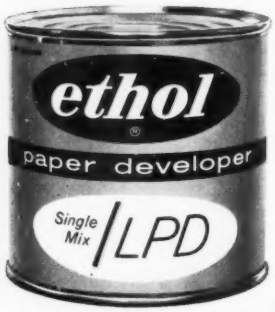

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F.Y.I.

The National Audio Visual Association has just obtained a statement from the Internal Revenue Department clarifying the tax position of sound slidefilm or filmstrip projectors. They are not considered phonographs, and are not subject to tax. NAVA, Fairfax, Va., has the original of the ruling in its files, and can furnish certified copies.

Opportunity knocks

High school seniors or graduates may apply for the scholarship given annually by the Professional Photographers of America, which consists of a year's college-level course in professional photography at the Rochester Institute of Technology. The scholarship is granted on the basis of scholastic record, character, need, and for demonstrated interest in and talent for photography. Full information as well as applications—which must be in by April 1—from the Executive Manager, PP of A, 152 W. Wisconsin Ave., Milwaukee 3, Wis. PMI has few—if any—high school readers, but our older readers must have youngsters who could take advantage of this chance to start in the field the right way—with a year's training in a fine school.

Two contests

For the competition minded a trip to New York to photograph the 38-story Seagram Building at 375 Park Avenue might pay off in a $300 first prize. Contest is being run by the Chase Brass & Copper Co. to publicize building's use of bronze. Full particulars from the company at Box 2611, Grand Central Terminal, N.Y.

Another contest is being run by The Moggs Creek Clickers (c/o Zillah Lee, 197 Edwardes St., Reservoir, N. 19, Victoria, Australia.) Called "Photovision," the contest comprises four classes; prints, slides (black-and-white and/or color), sound or silent motion pictures (no 35mm) and an open class for "any attempt utilizing photography to give an insight into the nature of things." Entries close April 1, and winners will be exhibited at Charlie's Studio, Carlton, Victoria. Here's a chance to develop an international reputation. More power to the Moggs Creek Clickers for biting off a large hunk. Prizes total £25 Aust. in each class, £100 Aust. in all. —THE END

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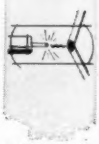

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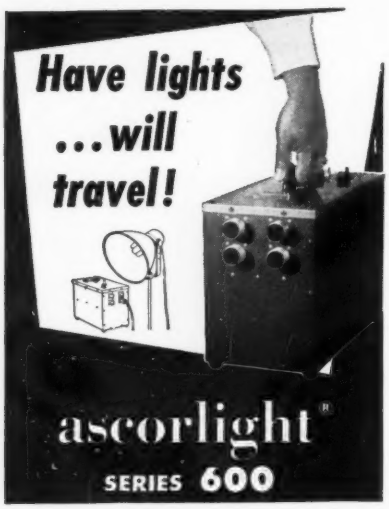

Power-packed, yet portable (only 24 lbs.) . . . therefore ideal for location work as well as in the studio. Features four light outlets, built-in trigger tube circuit, choice of four light styles. A602, includes one 800 watt-second capacity power supply and one light unit. 36,000 B.C.P.S./50°* output (more than most 1,000 watt-second units weighing over 60 lbs.) . . . $598.

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63-01 Metropolitan Ave., Middle Village 79, N.Y.

Get more information. Circle 402, page 65

by Edward R. Farber

ELECTRONIC FLASH

Strobemeter speed flash meter is quick and compact, but not cheap

Since its introduction back in 1949, the "Edgerton" or General Radio meter has been the only commercially available means for measuring exposure for electronic flash photos. It is neither small nor cheap.

Now the Thomas Instrument Co., 153 E. 26th St., New York 10, N.Y., manufactures the second entry in the field. It is simple, compact, but not cheap either.

F. A. Thomas, who has worked for years as a commercial industrial photographer, devised the new Thomas Strobemeter. It is the culmination of over a year's effort to design, as Thomas says, "something whose operation is foolproof, quick and self-evident."

Though it can be operated from a battery pack, operation from the 110 AC line is the usual procedure. The unit stabilizes 15 seconds after the power is turned on zero. The calibration of the Film Speed Knob is based on average processing. Thomas recommends an index of 12 for Ektachrome, for example. The Range Switch is set to the range in which exposure is expected to fall. A cord is run from the outlet marked "Sync" to the trip outlet of the flash unit.

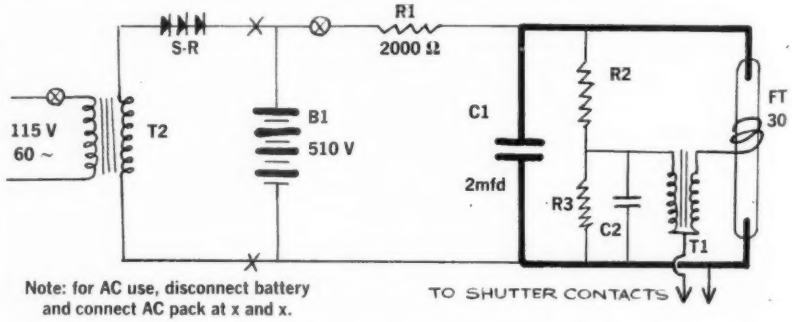
In use, the meter is pointed at the lens of the camera from the subject's position. When the button on the Strobemeter is pushed, the lights flash and the meter reads directly in f-stops. The needle is held only as long as the button is pushed. Thomas has used a unique method of marking on the exposure scale and it is indeed useful. Let him describe its use: "Where the main light is from the side or back, the meter should be pointed at the main light (for one reading) and then at the shadow or fill (for a second reading). This method gives the lighting balance or ratio and allows proper exposure to be easily calculated. For example, if the main light reads f/14 and the fill or shadow reads f/8 then the difference between the two is 1½ stops. This is a lighting ratio of about 3:1, and the proper exposure would be f/10.5. What could be simpler?"

As an aid to this technique the arc on the dial face has different shades of grey. These indicate the various ratios between f-stops to

(*continued on page* 12)

CORRECTION

The diagram for a high-speed electronic flash circuit incorporating a General Electric FT30 tube, explained in this column in PMI January, 1959, was incorrect. It failed to indicate the proper connection for shutter contacts. A revised diagram is shown below. Components are listed in the January issue, along with addresses of suppliers.



Note: for AC use, disconnect battery and connect AC pack at x and x.

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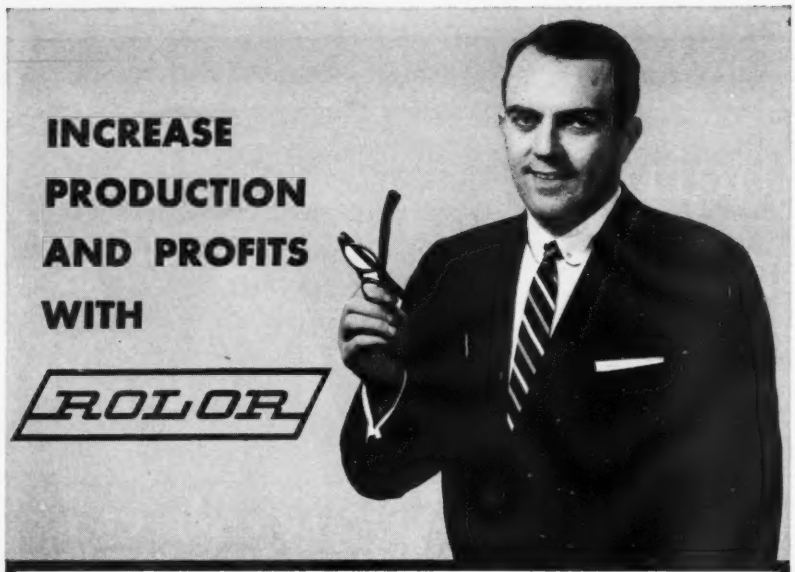

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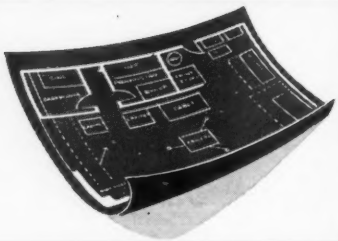

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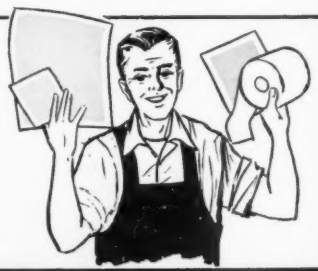

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help get a desirable balance of lights.

To make it easier to investigate the light intensity in the different areas of the picture, Thomas has made a small probe for some of his photographer customers. This plugs into the meter.

Thomas has no use for ground glass probes, of which he "heartily disapproves". He says: "They seem to have the semblance of great scientific accuracy, but in practice turn out to be just about opposite. In minimizing two variables, the actual f-stop setting of the lens and the bellows extension, so many uncontrollable factors are brought in as to render the final result less accurate than simple guesswork. . . . Having to read a card of known reflectivity, carefully placed so as not to pick up unwanted highlights, and which must appear a certain size on the very center of the ground glass is hardly conducive to great accuracy and control.

"Particularly when you realize that the bulk of close-up photography uses very strong back or side main lighting, and the white card, by implication, can only read a frontal light."

Not everyone will agree entirely with Mr. Thomas on this point. To me his feelings emphasize the fact that photographic exposure is not easily measurable. It is so obscure an art that we have controversy over what and how to measure to say nothing of with what instrument.

Thomas also commented on a recent story in PMI about a West Coast photographer who added a ping pong ball to his GR meter to integrate the light from all directions, "it's a very old and common idea" and "gives no idea of the extremes of light involved or their direction."

Thomas says his Strobemeter is accurate within five per cent, which is 1/20 stop. A voltage regulating circuit renders the unit relatively insensitive to line voltage variations. A balance bridge circuit is used to compensate for shifts in component values Thomas reports that he has already delivered some 75 meters which sell for $265.

Of course consistently good negatives and transparencies are not merely a function of the accuracy of meters or the care in their use. Obviously, the accuracy of the emulsion speed rating, timing, agitation, thermometers or temperature control systems, the care with which the film was stored, the care in mixing chemicals, etc., are as important as a good idea of the light falling on the film.—THE END

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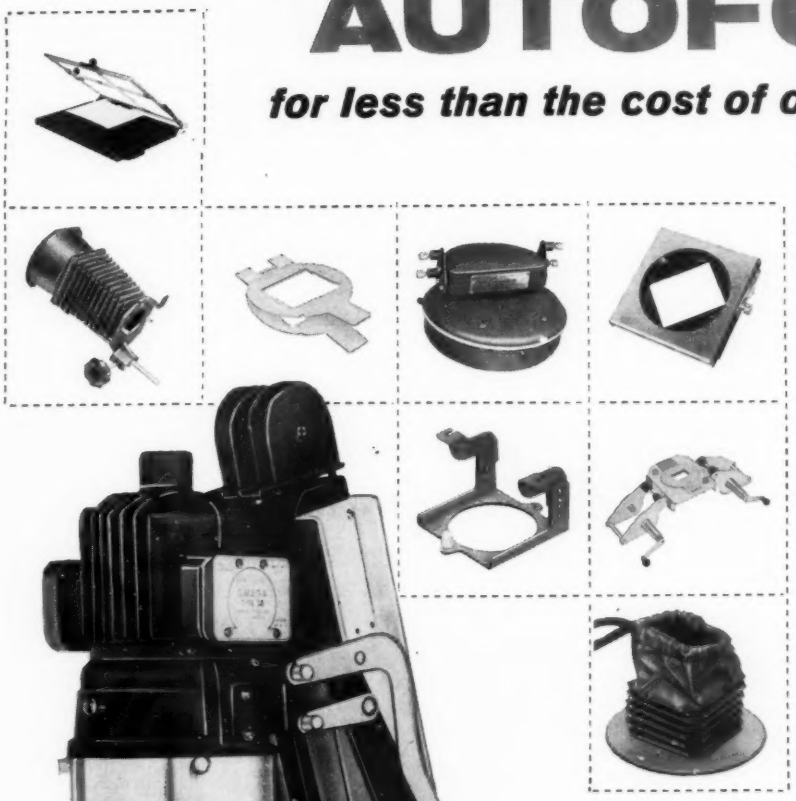

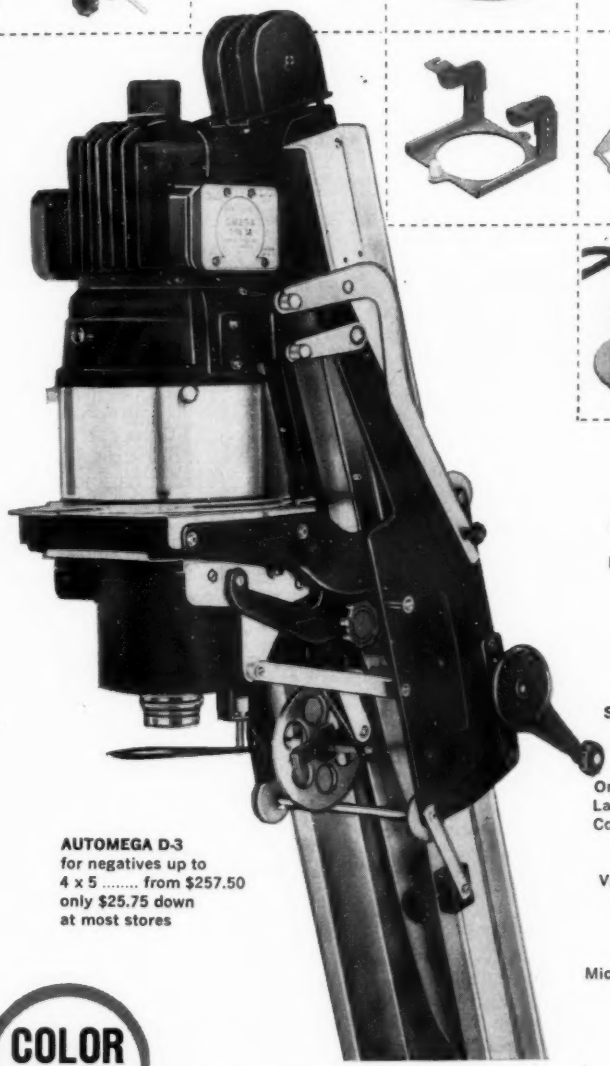

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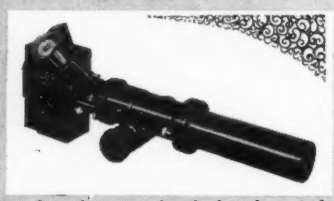

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by Herbert P. Paschel

REPRODUCTION & GRAPHIC ARTS

Dropping out the whites: graphic copy and studio camera technique

As a general rule the highlight region is the tonal area that suffers most in the halftone process and continuous-tone copying. The chief problem is dropping out the non-image background areas (solid whites) while at the same time holding the most delicate highlight tone. Unless there is considerable tone separation between the whites and the lightest perceptible image tone, achieving a drop-out by straightforward camera techniques is virtually impossible.

In an effort to influence the solid white areas without distorting the high-light end of the tone scale in screen photography, a host of high-light methods have been proposed. Diaphragm stops of unusual shape, decentered stops, screen oscillation and special halftone screens are but a few of the ideas that have been tried. While a review of the many systems introduced throughout the years would make interesting reading, suffice it to say few proved entirely reliable in practice.

The underlying reason for the failure of most drop-out techniques can be attributed to the extremely narrow tolerances separating success and failure. However, slight variations in copy characteristics, reciprocity effect, exposure errors, light fluctuations, lens flare, development errors, etc., singly or in combination make precise control impossible.

Relatively few of the methods that have been introduced throughout the years have survived. But surprisingly, the first and oldest method ever proposed is not only the simplest but it is still in widespread use at the present time. The method involves first making a normal halftone exposure and then, with the screen removed, superimposing a weak line exposure over the previously exposed screen image. When the dual exposures are properly timed and proportioned the resulting negative is veiled over in the extreme whites without serious encroachment on the light tones. The procedure works equally well with both engraved glass screens and the vignetted, contact screens. To the many cameramen currently using this technique it will undoubtedly come as a surprise that the method was employed and patented in the late 1800's by that pioneer graphic arts technician, Frederick J. Gerland.

The Gerland method is also the basis for several patented "art" techniques which automatically incorporate in the wash drawing a means for differential and controllable reflectance between tone and white.

With the Kromo-Lite process, the artist uses a special solvent instead of water in making a wash drawing. A completed Kromo-Lite drawing is, in appearance, no different than a conventional wash drawing. Just prior to the photographic manipulations the drawing is sprayed with a second solution which generates a uniform yellow color in the tone areas of the drawing. The background areas, not having been treated with the first solution, remain white. A regular halftone exposure is made utilizing a yellow filter. The drop-out exposure, through a blue filter and with the screen removed, records only the non-yellow highlight and background.

Other special copy preparation methods make use of the phenomenon of fluorescence. With the Fluorographic process the artist uses a special fluorescent liquid as the solvent for his wash colors. The completed Fluorographic drawing is exposed just like any other copy for the half tone part of the treatment. The screen is then removed and the drop-out exposure made with an ultra-violet transmitting filter over the lens. How the tone and background areas are effectively seperated may be explained as follows. The filter used during the drop-out exposure limits

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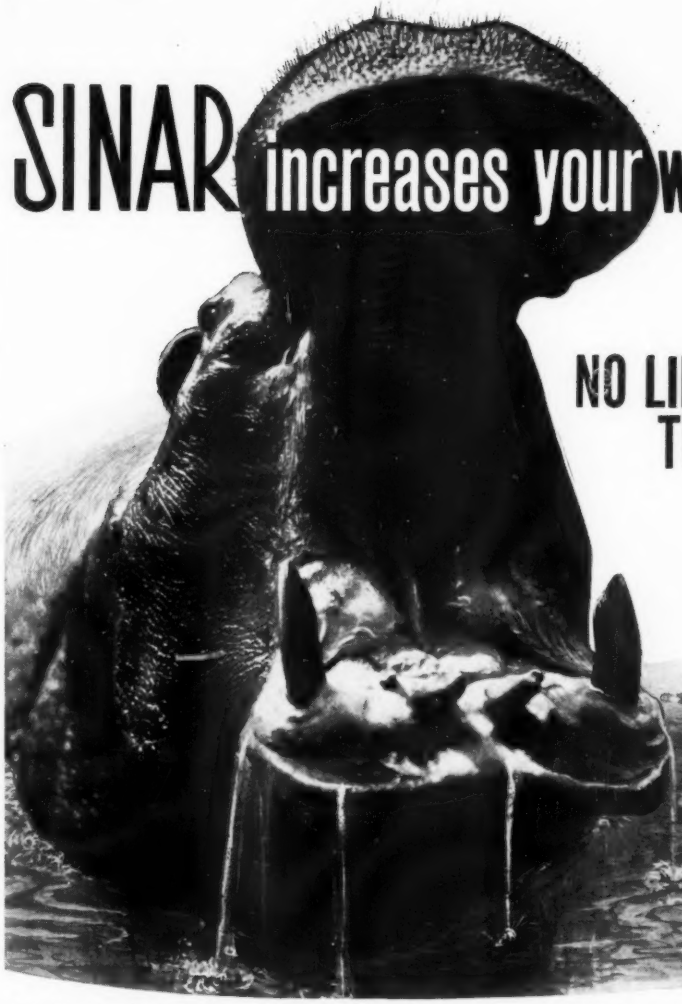

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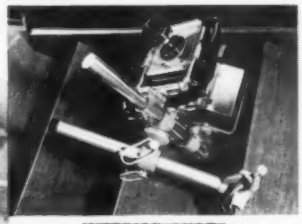

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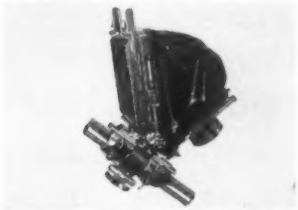

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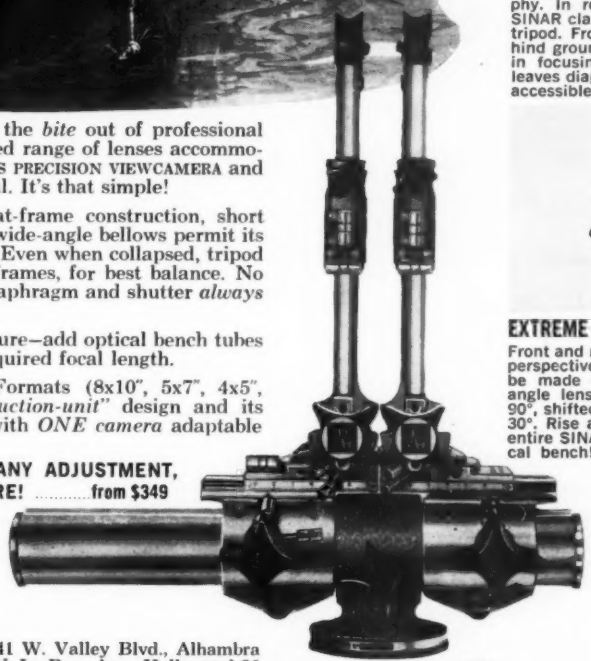

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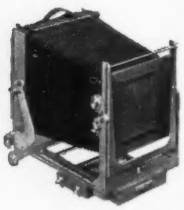

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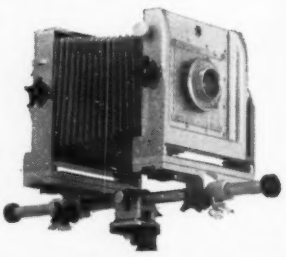

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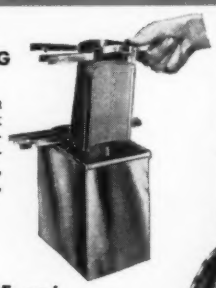

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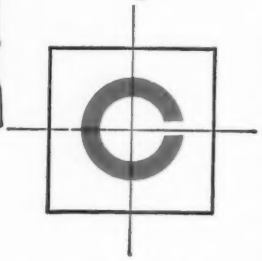

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Get more information. Circle 413, page 65

the exposure to ultra-violet radiation. The tone parts of the copy fluoresce and thus absorb the ultra-violet component of the incident illumination. The untreated white areas reflect both ultra-violet and visible rays; the filter limits the drop-out exposure to the reflected ultra-violet rays.

With the Kemart process, the artist not only uses a special solvent for his wash colors but creates the drawing on a special fluorescent drawing board or paper. In making a halftone from Kemart copy the photographer again first employs a normal halftone technique. With the screen removed, the drop-out exposure is accomplished by illuminating the copy with ultra-violet radiation. An ultra-violet absorbing filter over the lens prevents the ultra-violet rays reflected from the tone areas from reaching the film. The white areas, being fluorescent, reflect visible rays which pass through the filter and record.

The three special copy preparation drop-out methods outlined (Fluorographic, Kemart and Kromo-lite), offer definite advantages in all instances where camera copy is normally artwork. With little extra expense in time and material they make possible a distinct separation of background and tone and are thus as near to a fool-proof drop-out system as it is possible to achieve.

With conventional copy the Gerland method can also be made virtually foolproof simply by making the halftone and drop-out exposures on two separate pieces of film.

In the two-stage method a regular halftone negative is made without regard to the appearance or rendition of the highlights. Using the same or similar type of film as was employed for the screened negative, a line shot is made which records only the extreme whites. For contact printing or platemaking the drop-out and halftone negatives are superimposed in register. The advantages which favor the two-stage method, even in view of the additional film cost, lie in the fact that if an error occurs only one negative need be made over. In addition, over-exposure of either negative, if not excessive, can be corrected by chemical reduction.

What this amounts to, of course, is a highlight mask. The system is just as applicable to ordinary copying and to studio work—where a normal tone photograph of the subject is made first, and a high-contrast negative to mask the whites is made second. In many types of product photography, for example, this method can lead to considerable savings by eliminating opaquing. —THE END

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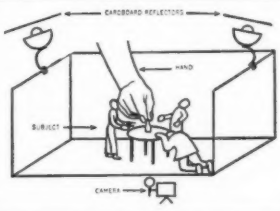

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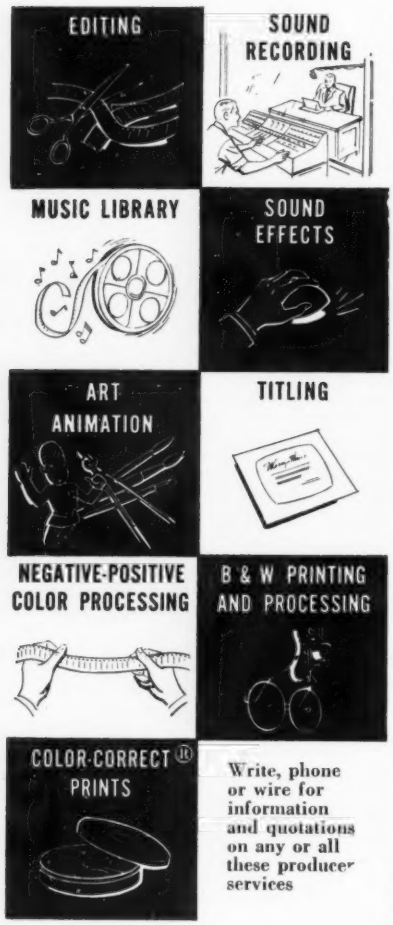

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by Arnold Eagle

INDUSTRIAL MOTION PICTURES

Color motion pictures; what you need to know about camera films

Many industrial motion picture cameramen consider shooting color as simple as shooting black-and-white. One must be practical, however, and recognize the facts. The use of color does require specific technical knowledge; and the intelligent application of color calls for a slightly different kind of seeing and thinking on the part of the film maker. He must face the esthetic problems of color. He must decide what type of film and what printing process to use. He must be prepared for the constant variation of speed and color characteristics of each new batch of film. He is confronted with the problem of correct color rendition—he must know how it is affected by the color of his light sources, his filters, lenses, the properties of his film and many other factors. He must even consider the projection method and the type of screen to be used in viewing his color print.

Six color films

At first glance there seems to be a bewildering variety of color films and color prints methods from which to choose, but the choice is much more limited than in black-and-white cinematography. There are three types of Eastman color camera films: regular Kodachrome for direct projection, low contrast Commercial Kodachrome, and the new low contrast Commercial Ektachrome. (The low contrast films are designed to serve as masters for subsequent prints.) These will soon be reduced to only two because Commercial Ektachrome Type 7255, will replace Commercial Kodachrome, Type 5268. Ansco offers three types of camera color film: fast (E.I. 100) Super Anscochrome (really a special-purpose emulsion), low contrast Anscochrome Professional and regular Anscochrome.

Regular Kodachrome and Anscochrome come in tungsten and daylight, while the low contrast commercial films come only in tungsten 3200K, and for daylight must be used with a conversion filter.

Many industrial film makers using regular Kodachrome confine themselves to Type A (tungsten) and use a Wratten No. 85 conversion filter when shooting in daylight. Kodachrome Type A has an exposure index of 16 which drops to 10 when the film is used with a Wratten 85 filter in daylight. This is the normal speed of daylight type Kodachrome. Its users, therefore, need use only one type of film in the camera whether shooting with daylight or tungsten light, without wasting the unused part of the roll—and not actually losing speed.

Commercial Ektachrome

Reports from photographers who have tried the new Commercial Ektachrome are enthusiastic. It will probably become a favorite with most professional film makers. However, the superb quality of regular Kodachrome—notably its lack of grain and its color rendition—will be tough to beat. It is true that Kodachrome, designed as a direct projection film, may generate prints of lower saturation (less color brilliance) and more contrast than the original, when printed with conventional materials. If care is taken to keep the lighting contrast down, however, very satisfactory second generation prints can be produced from it—and, with the introduction of Eastman Internegative Type 7270, release prints from regular Kodachrome can be made virtually as good as the original. Convinced by what they've seen, many film makers now prefer regular Kodachrome to the low-contrast commercial films for many projects.

Corrective color printing

The corrective filters recommended for commercial work with Kodachrome Type A can become a nuisance, especially when used in daylight. You start with an 83 conversion filter, then add one, two or three correction filters. That's quite a stack of filters in front of the lens, and no

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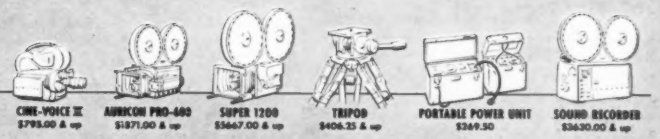

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great help in getting critical definition. If you have a "timed" answer print made, most labs compensate in the final printing to relieve the photographer of some of the filtration. These corrections are even more effective when you make A and B rolls. You have to know by experimentation how far you can go, however, before you start filming.

Anscochrome

The Anscochrome films also have their special points. With its 100 E.I. rating Super Anscochrome is almost a miracle film. It is quite grainy, but when you need speed, you can't be too fussy. As a matter of fact, sometimes when used with sure taste, this very quality of graininess is an advantage.

As for the regular daylight and tungsten Anscochrome with their 32 E.I. rating, they are still faster than any other 16mm color film. Some cameramen prefer the warm, pastel quality of their color rendition. Incidentally, regular Anscochrome can be boosted to 100 E.I. in emergencies. You must consult the developing lab about this, and should do it beforehand. The color might be slightly off, but sometimes the speed is well worth that sacrifice. —THE END

FOR YOUR BUSINESS

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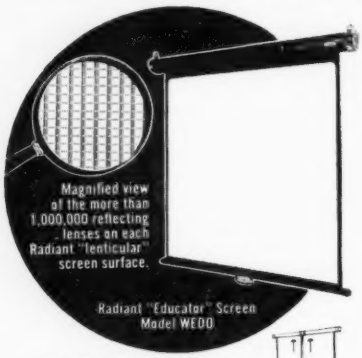
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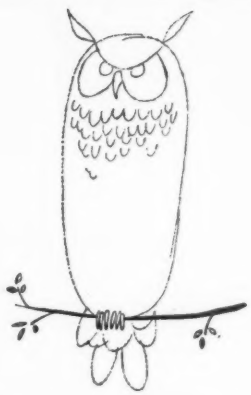

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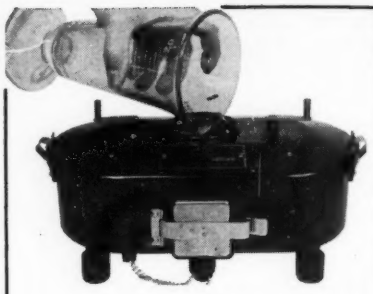

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The point we are making is that mishaps occur less frequently when you use CECO* equipment ... whether purchased or rented. We don't trust even **new** equipment until it is thoroughly checked out. It goes without saying that all rented cameras and accessories are overhauled before we send them out to new locations. It is significant that many Hollywood crews, abundantly equipped as they are, rent from CECO for New York locations.

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P.S. We hope we haven't given the impression that we deal only in large ventures. You'd be surprised how many items we sell here that cost around $1. Stop by, yes?

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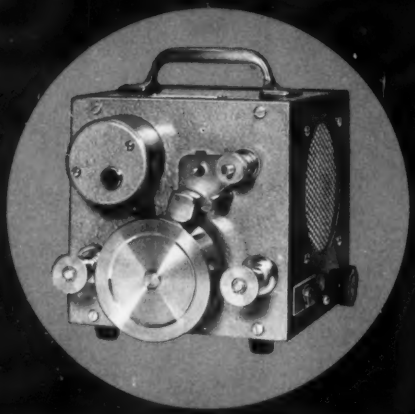

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Permits editing of both 16mm and 35mm Optical and Magnetic sound tracks. Features a Magnetic Head Mount with adjustments for track location, and adjustments for film and tape thickness. *Other models available.*

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The world's standard of quality. This *newest* PRO JR gives you super-smooth action and simple camera attaching method; Telescoping pan handle with adjustable angle, and sockets for left, right, reverse tilts; Special pan tension knob, independent of pan lock; Cast-in tie-down eyelets; Self-aligning double leg locking knobs.

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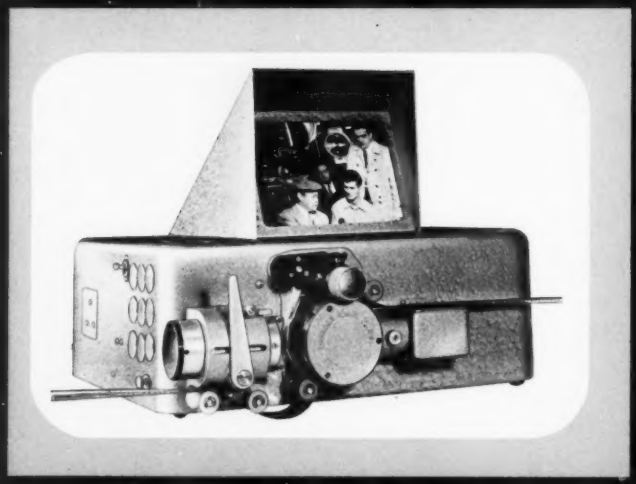

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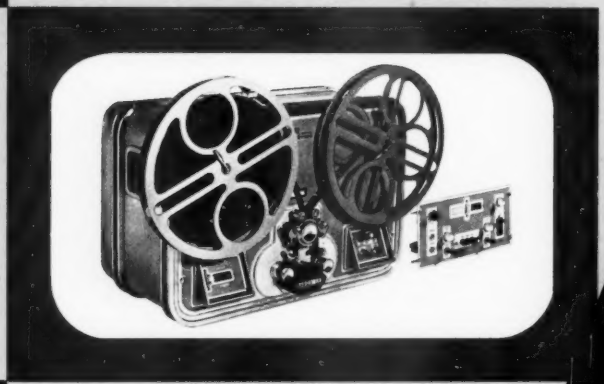

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Cine—Voice Camera modified to accept 1200-ft, 600-ft, and 400-ft. magazines; has torque motor for take-up. Also includes Veeder footage counter.

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Two Stroboflash II units were used for this photograph. With Stroboflash the wheel was stopped and correct exposure of both the model and the light bulbs was obtained.

With STROBOFLASH* there's no gamble!

STROBOFLASH has many virtues but at the top of the list is *plenty of light with dependable performance.* With STROBOFLASH, the photographer can easily overcome the harassing problems of vibrations, moving machinery, background lights, and hot spots. And, of course, industrial products, illustrations and record photos look their best when they're sharp and clear.

But let's not neglect the other virtues of the STROBOFLASH. It's economical, portable, rugged, protects the shutter, can be used for multiple flash, can be converted to slave operation for only $9.90 and can be used with an A-C rechargeable battery.

STROBOFLASH already has a reputation for dependability with the Pacemaker Graphic, Graphic View II and similar professional quality equipment and is now proving to be the perfect companion for the new Super Graphic.

STROBOFLASH I, 50 watt sec., complete unit†..... $ 89.00
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†Complete unit consists of power pack, lamp head, battery case adapter, and L-bracket.

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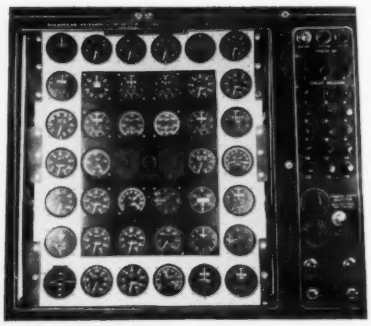
Here's a laboratory camera that can photograph any size subject...

from a PIP...



to a PANEL

THE BEATTIE VARITRON MODEL E data recording camera is automatic, electric, and achieves great versatility through interchangeability of lens and magazine combinations. Bellows construction gives wide focusing capability. 100 ft. roll film magazines for both 35 and 70 mm in a variety of aperture sizes are available. Varitron Model E systems are powered by either 115 volt 50-60 cycle AC or 28 volt DC.

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BEATTIE-COLEMAN *inc.*

1000 N. Olive St., Anaheim, California

Get more information. Circle 407, page 65

by Ernest E. Reshovsky

PHOTO INSTRUMENTATION

Optical ranging system focuses automatically and unattended

Not too long ago when the first "thinking" cameras made their appearance with the advent of automatic exposure control on motion picture (and still) cameras we all acted surprised and felt somewhat on the way to obsolescence. But we consoled ourselves with the thought that the cameraman was still needed to set up, load and focus the cameras.

Just now, we witnessed a demonstration of OAR, during which an optical system took care of its own "ranging" (focusing) automatically, silently and without any human being in attendance. The result was rather uncanny, with the lens moving itself to various focus settings, as cars and people passed through the angle of acceptance of the optics.

OAR stands for Optical Automatic Ranging system, a process of Comapco Inc., Encino, Calif. The demonstration was supervised by Mr. Howard M. Greene, research director of Comapco Inc. and co-inventor, with Homer A. Engle, of the system.

The way Mr. Greene explained it, OAR consists of five different integrated parts: 1) a lens, of either the refractive or the reflective mirror type, which has a magnification of less than unity, and which forms "a real optical image" of an illuminated object. 2) an oscillating "sensor," which is placed within the focal area of the optical image. The sensor is a group of photo-electric cells in continuous motion back and forth along the optical axis of the lens system. The sensor's changing electrical energy output corresponds to the varying intensity of radiant energy encountered at each point of its oscillating travel. 3) a signal amplifier which increases the electrical output of the sensor and passes the resultant signal on to 4) a servo-amplifier, which in turn converts the signal information into electrical impulses to be followed by the 5) servo-motor. This motor does the actual focusing of the lens, in accordance with the "sighting" of the sensor. Mr. Greene explained that the heart of the system, the sensor, is a series of photocells mounted on a moving coil within an electro-magnet, such as is used to drive the cone loudspeaker, with the sensor being aligned along the optical axis of the lens.

The principle behind the OAR system is the realization that the sensor will emit a fluctuating electrical signal whose frequency is twice that of its rate of oscillation, when the lens is "in focus" with the object sighted. At this time the plane of image focus coincides with the midpoint of the sensor's oscillation. As the plane of image focus shifts away from this midpoint, the signal frequency changes at an accurately predictable rate. The rate of this frequency change is used to activate the servo-motor which in turn takes care of the lens focus corrections.

The speed with which OAR adjusts to various focal situations is related to the frequency with which the sensor is oscillated. At present, 60 cycle AC is used for test purposes and the speed with which the demonstration model adjusted its focus was adequate to track at about 20 mph with the motion towards the test rig's 2-in. lens. Mr. Greene emphasized that as more rapid reaction is required it is intended to use higher frequencies, such as 100, 400 and 1000 cycles to drive the oscillating sensor.

To put OAR to use on motion picture cameras, it is planned to use the light gathered by the taking lens to actuate the OAR mechanism. Cameras with mirrored shutters, such as the Arriflex, would lend themselves readily to adaptation for the system, said Greene, with the light which is deflected by the mirrored shutter at closed position being fed into the sensor element. In the case of TV cameras, which are shutterless, OAR would either employ a matched lens of its own or a beam splitter behind the taking lens. OAR's photocells are sensitive enough to operate with only 10 per

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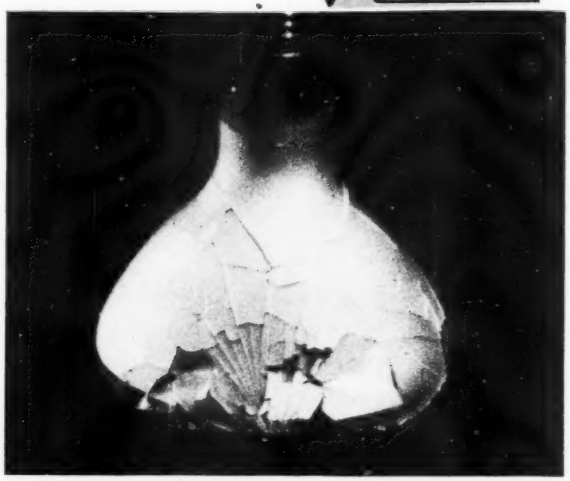
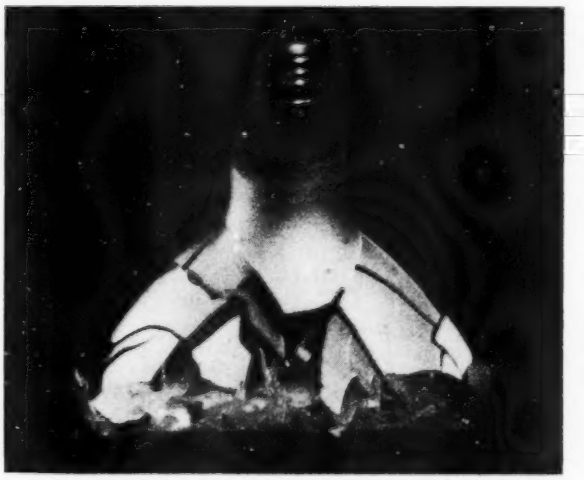




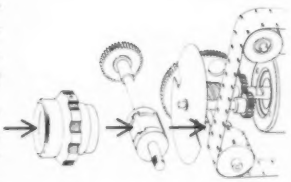
Shot at 1000 frames per second, 36° shutter, 1/10,000 second exposure

at 1000 pictures per second you see all *the action...in laboratory experiments, missile recording, documentary footage, auto safety studies, time-motion studies, rocket engine testing, aircraft flight testing, and industrial analysis.*

This rocket-age sharpshooter takes full-frame, extremely high-resolution pictures under the most unfavorable environmental conditions. It is light, compact, and made for operational convenience. Start and stop it for runs of less than magazine capacity if you wish . . . change exposure time simply by "dialing" different shutter openings (9°, 18°, 36°, 72°), giving a range of selective and precise exposures from 1/60 second to 1/40,000 second . . . change film capacity quickly and easily by attaching one of the interchangeable magazines (100, 200, 400 or 1200 ft.). Range of frame rates with one motor—12 to 1,000 frames per second. Standard package includes 16 mm Photo-Sonics 1B camera, heater, two timing lights, three sets of motor reduction gears, 100-ft. magazine and carrying case. Many accessories and complete range of lenses are available. Ask Traid for the full story on this remarkable camera; or ask about other 16mm and 35mm rotating prism cameras with frame rates up to 4,000 pictures per second, and featuring the same high resolution prism and disc shutter combination.

The 16mm-1B is only one of Traid's many on-the-shelf data recorders to fill your photo instrumentation needs. Traid distributes one of the most extensive lines of 16mm, 35mm and 70mm cameras and accessories in the U.S., with both rotating prism and intermittent type movements, time-lapse, standard speed, and high-speed picture-taking rates. Talk to Traid first for a better, faster answer to your photographic problems.

Prism and rotating disc shutter turn in synchronism with continuously moving film. Prism provides image compensation; disc shutter produces high resolution and even exposure over full frame. Combination of prism and disc shutter eliminates "image smear" common with other prism cameras. Film at aperture is flat, not curved.



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Dear Mac:
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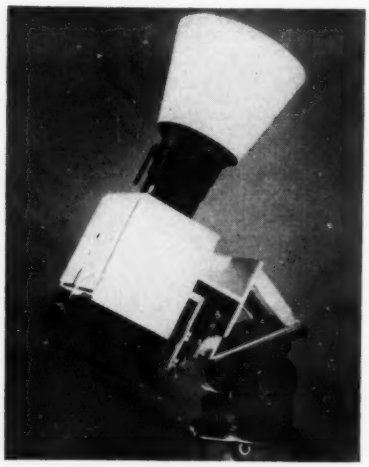
cent of the available light having to be deflected in the sensor element.

Satellite surveillance camera

With everybody nowadays seemingly bent on putting all sorts of items (Sputniks, Atlases, dogs, monkeys etc.) into orbit the need to photograph these various flying objects is facilitated greatly with the announcement by the U.S. Navy of a camera designed for just that.

The U.S. Naval Ordnance Test Station at China Lake, Calif. where the camera was developed gives it the formidable name of "Synchronized Smear Camera for Satellite Surveillance and Detection" and promises that it will "detect and record the presence of many friendly and unfriendly satellites."

The camera, whose development is credited largely to Jack T. Leininger, a photo-technologist at NOTS, is equipped with a f/3.5 10-in. lens which produces an image of 5 x 5½ in. The film speed travel which is synchronized with the satellite image can be varied from 3/10 in. p/min. to 10 in. p/min. and a satellite



Navy's satellite camera

can be followed on a single exposure for as long as 10 minutes. When the angular rate of the satellite is properly coordinated with the film travel, the satellite is recorded as a dot, while all astral bodies not travelling at that exact speed appear as streaks on the film. The camera is electrically driven and its timing instrumentation is keyed to radio station WWV (Bureau of Standards) Washington, D.C. to time the exact millisecond of a satellite's passing.

A battery of nine such cameras can cover the sky from horizon to horizon and are able to maintain a "photographic watch" with cameras rolling for three hours, using the capacity of 56 ft. of film. —THE END

Mary Pickford in *Pollyanna*, 1920.

cfi ...40 years serving the film industry

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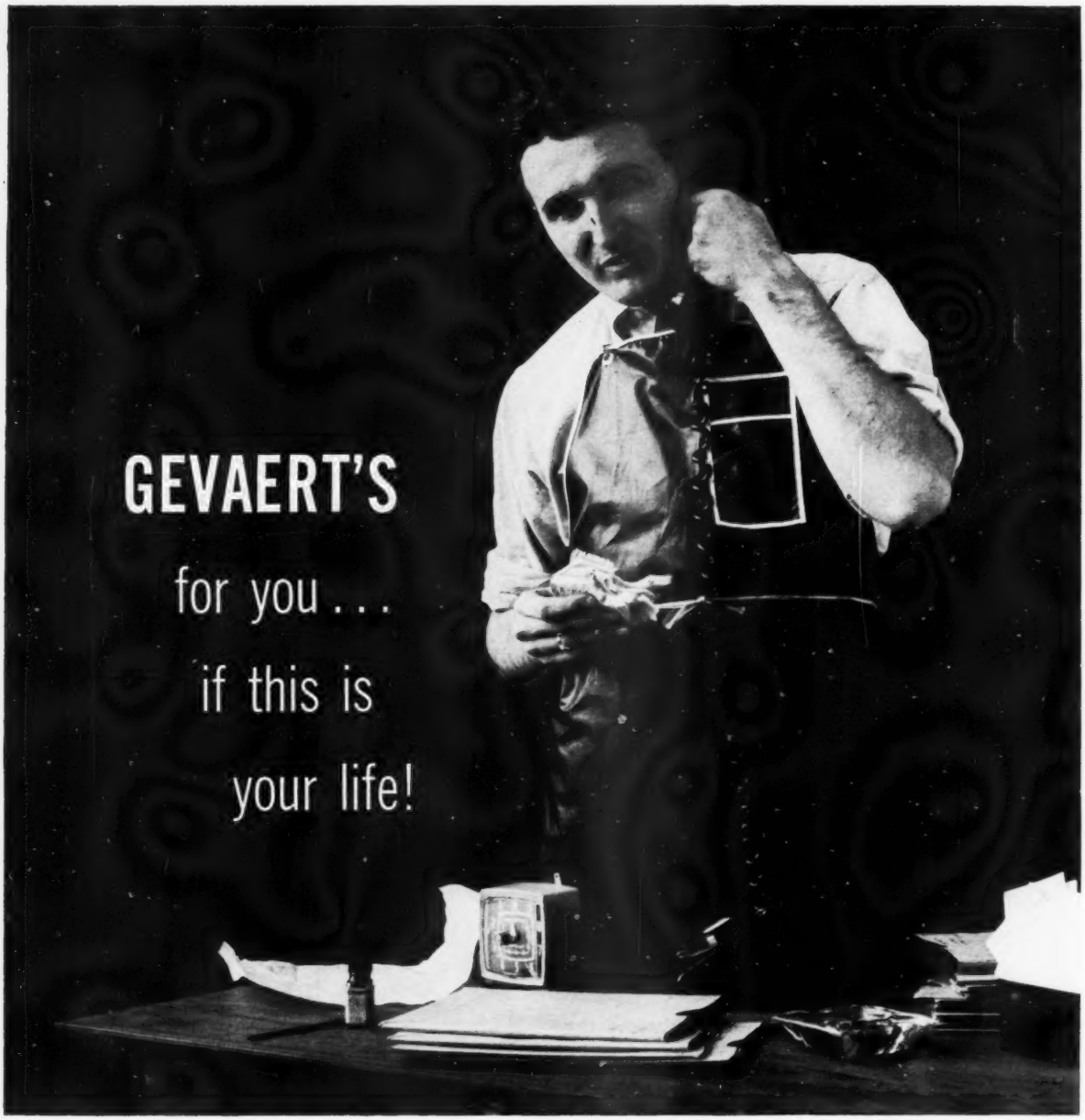

Rushed? Gevaert Gevapan Sheet Film takes away the feeling of being harried by time! Reason is: Gevapan Film has "leeway" built in. Gives you perfect results—even if time or temperature aren't right on the nose. Other values: Gevapan lies flat—gives superb gradation.

Where detail is critical, choose GEVAPAN 30 (ASA D64 T40—it has moderate speed, finest grain. Newly improved GEVAPAN 33 (ASA D125 T80) is an all-around film with high speed, long scale, fine grain. Shooting on big sets, or under adverse conditions? You want GEVAPAN 36 (ASA D250 T160). Very high speed—gives top results, even on "problem" work.

See? No matter *what* your shooting or developing conditions are, Gevapan Sheet Film gives you truly professional results, every time! Choose it, use it! It's the film you can stake your professional reputation on.

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Get more information. Circle 430, page 65

AN EDITORIAL

ARE THERE BRAINS UNDER THE BERET?

The trouble with photography today is that any slob who can make a picture of his girl friend (1/100 at f/11 in bright sunlight) feels he can—and ought to—make a career in the field. Human beings being as fallible as they are, these cockeyed wonders often succeed in conning unwary personnel men into hiring them as industrial photographers. The results are not catastrophic—they are merely disgusting.

It's about time that we in the industrial field faced the fact that photography in the service of industry is a slightly different proposition from photography in the service of human vanity. A man who can make a real smoochy picture of a blonde on a beach can often make just as good a picture of the crack in piston No. 4 that caused all the trouble, but not always. And when he fails his failure is apt to be complete and absolute. It doesn't work the other way round—a man who can get a good picture of the crack in piston No. 4 can generally be depended upon to get a good picture of anything. We hate to place ourselves in the position of saying we're agin artists in the field. It isn't true. We're all for artists in the field—only they've got to toe the mark. A photographer doesn't get to be an artist merely by growing a beard and feeling he'd be much happier if he could afford psychoanalysis. The proof is in the print. If he's an artist he'll bring his almost miraculous gifts to bear on whatever problem there is before his lens, from nuts and bolts to shorts and a halter.

So next time you're faced with the job of hiring a photographer, don't be misled by mere misery. Demand talent as well.

The kind of talent that will adapt itself to the problems that come up in lab and factory; that can figure out photo ways out of impasses that make engineers weep. And once you've got him, pamper him. He's worth his weight in radium.

The Editors

ACCELERATED PROCESSING

In less time than it takes you to read this subhead you could make, process and project a picture. Of course it takes special techniques all the way down the line. Here Eugene Ostroff gives you a rundown on the pertinent procedures and prevalent practices, with some signposts pointing to ways they may be useful in your darkroom.

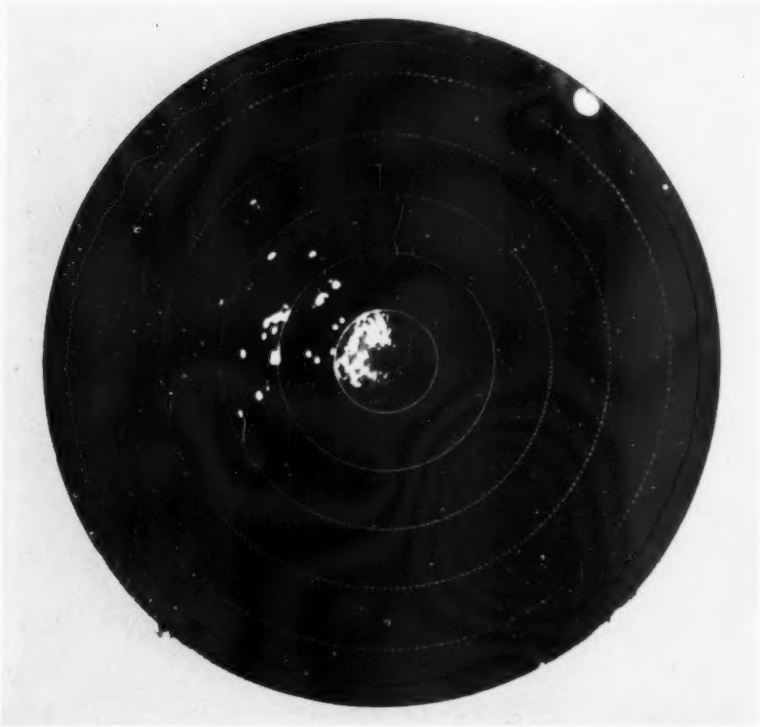
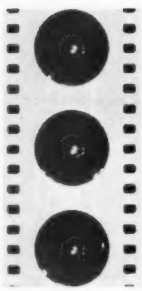


IMAGE QUALITY AT .2 SEC.

If one is really eager it is possible to develop, fix and project a negative in 2/10 sec. This is no speculation. The picture *(above)* is a reproduction of a print from a negative made at this hasty rate. It is a sharp reproduction of the face of a radarscope, apparently grainless in this 5½X blow-up from the 35mm original. Text explains technicalities, diagram of processing unit is shown overleaf. Picture courtesy of Specialties, Inc., who developed unit with Army.



In every photographer's life there comes a time when he wants, or desperately needs, a shortcut from camera to picture.

Newspaper, night club and TV photographers have been using more conventional accelerated processing for years. The routine is: a 40-sec. to 4-min. dip in a print or energetic film developer, a quick, quick-fix, wiper blade squeegee between hypo and enlarger, print development, fix, dunk and dry. A total of 8 to 10 minutes, unless the photographer is suffering a hangover, or dallies to wash the negative or print a bit.

Today it is not only the newshound who worries about the celerity of the photographic process. As photography pokes into more, and more complicated, technical corners it is called upon to do its job faster. A new man whose title is of recent minting, the systems engineer, is often found doing the worrying over how fast the picture is going to get out. While the fast processing of well-known techniques is measured from Dr. Land's famed one minute up, the systems engineer is generally thinking in terms of seconds and fractions of seconds. But he, you, Dr. Land and anyone else concerned with photographic processing is faced with the same facts of speed. Facts that are under some close scrutiny these days.

Let's take development first. The variables in development rate are (1) solution temperature (2) the concentration, composition and al-

kalinity of the solution (3) agitation and (4) the type of film and the exposure given it.

Elevated temperature

The rate of any chemical reaction increases with increasing temperature—and photographic development is no exception. As the temperature is pushed up, image development increases at a faster rate than does fog. There is a point, however, at which the fog becomes objectionable. This point of course varies with the purposes of the picture—in cases where tonal reproduction is important, fog is anathema; when it's a matter of a picture at any price, of course, tolerances are much greater. Anti-foggants are of only limited value in elevated-temperature accelerated processing because they tend to slow development, thereby defeating the purpose.

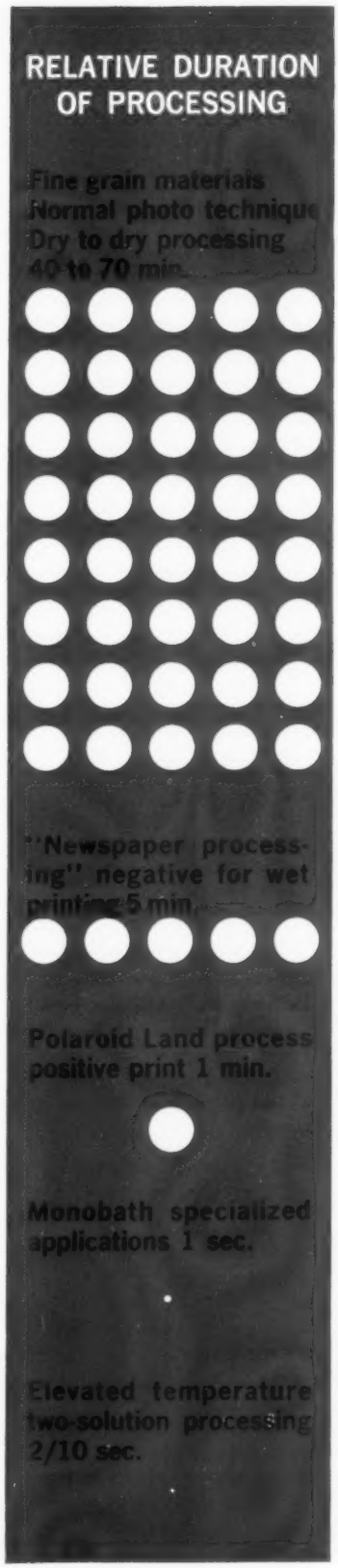
Another limit is imposed by the hardness of the emulsion. Roll films commonly available can safely withstand developer temperatures of no more than 80 or 90°F. Excessive pushing in this direction is a classic example of haste making waste, as anyone knows who's seen an image slither off a film base. In contrast to regularly available films, some paper emulsions tend to resist fog and are so hardened in manufacture that they can actually tolerate boiling water. Some specialized prehardened negative emulsions can be processed at 170 to 200°F. Technical representatives of the film manufacturers should be consulted about available products.

Developer composition

Generally speaking, development rate increases with (a) greater alkalinity and (b) greater concentration of the developing agent. Diminishing returns set in when the optimum concentration and pH (or degree of acidity/alkalinity) is exceeded for any particular film-developer combination. The systems engineer arrives at this optimal combination by experimentation, with the aid of precision measure instruments—such as a densitometer—and an accurate analysis of results. As a rough-and-ready alternative, a photographer can choose a standard rapid-development formula heavy in developer and alkaline ingredients, from a handbook.

Agitation

Development time may be cut by as much as 30 per cent by using continuous vigorous and turbulent agitation. With increased agitation the image develops faster than fog, for development to a given gamma.


RELATIVE DURATION OF PROCESSING
Fine grain materials
Normal photo technique
Dry to dry processing
40 to 70 min.
"Newspaper processing" negative for wet printing 5 min.
Polaroid Land process positive print 1 min.
Monobath specialized applications 1 sec.
Elevated temperature two-solution processing 2/10 sec.

Here a distinction must be made between the terms "vigorous" and "turbulent" as applied to agitation. When there is merely a vigorous flow of developer across the surface of the film, friction slows the flow immediately adjacent to the emulsion surface, creating a layer of relatively stagnant solution where it hurts most. Development exhaustion products diffuse from the emulsion into this stagnant layer, where they are apt to cause erratic development. On the other hand, turbulent agitation sets up whirlpools which penetrate this stagnant solution layer, dissipate the exhaustion products and supply fresh developer. The results of ineffective agitation are accentuated by fast-working solutions.

Agitation techniques proven to be successful are gaseous burst, vanes or fins which move back and forth past the emulsion surface, spray jet, and immersed rollers.

Jiggling film in solution *does not* provide an effective turbulent pattern. Outside the methods named the best bet is to rapidly, but not necessarily violently, lift the film out of the solution, drain it momentarily and replace it.

Film and exposure

Thin emulsions generally will develop faster than other types and heavier exposures accelerate the development induction period, the delay until the first grains of silver form. Another factor is that some emulsions swell more than others. This swelling makes diffusion of solutions into and out of the emulsion a much slower process. Published information and careful experimentation are the only guides to the exposure-film combination that will produce a desirable image in the shortest possible time.

After development

It is possible to reduce drastically the time necessary for post-development treatment of the image where speed is the primary consideration. The idea of after-treatment is to make the image last and deviations from the recommended procedure usually sacrifice permanence. Other probable sacrifices are economy and consistency.

To accelerate post-development treatment, certain steps such as the

(*continued overleaf*)

acid rinse and washing can be eliminated entirely. Unless caked with hypo and if stored dry, unwashed photo images can last for months without marked deterioration. Heat and solution concentration figure in the speed with which a particular emulsion can be fixed to a lesser degree, however, than they affect rate of development. Also important are the thickness and other properties of the emulsion, e.g., its silver iodide content.

Drying time

Thicker and more swollen emulsions retain more water and take longer to dry than do thin and nonswelling emulsions. It goes almost without saying, too, that the less absorbent the film or paper base, the faster the drying. Squeegees and wetting agents help drain surplus water and combat droplets which form on the back of the film or paper. The droplets evaporate, drawing heat from the emulsion—sometimes tripling drying time. Forced, heated air at low relative humidity greatly accelerates drying, but care should be taken not to over-dry the material, setting up stresses that permanently twist and distort the film or paper.

That 2/10 sec. unit

An example of highly efficient application of all these principles is a system for screening, almost immediately, pictures of a radarscope for a roomful of persons responsible for air traffic control. Prehardened, thin-emulsion films which develop, fix and dry rapidly, used in combination with equipment using a minimum number of processing stations, are the components of this rapid processing system, reported at the 1958 Conference of the Society of Photographic Scientists and Engineers by the U.S. Army Signal Research and Development Laboratory.

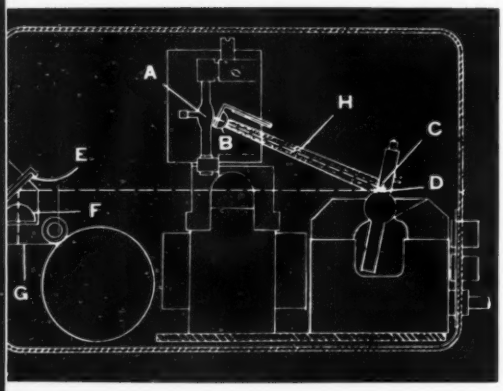
This unit can project a photographic image of a radarscope two-tenths of a second after exposure. For processing, a rubber ring clamps down on the film around the image area, forming a sealed chamber which is flooded with developer at 185°F. The solution is evacuated and the film is moved to the next chamber where the process is repeated with fixer at 205°F. This second chamber is transparent and the developed image is projected through the clear chamber walls as it fixes. Film drying is simplified because only a circular image area is wet and the thin-emulsion film dries rapidly on exposure to surrounding air. No wash is used and the dried film can be stored at least 12 months without appreciable change in quality. The film can be washed later for more permanence.

Monobaths

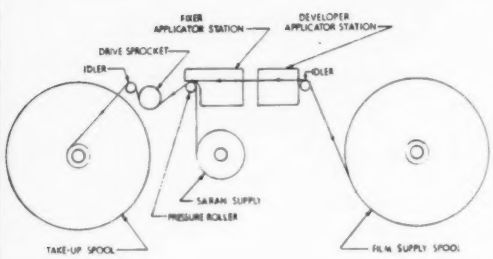
Monobaths, combined developing and fixing solutions, simplify the processing equipment needed. These single solutions fix the image as it develops. The balance between development of exposed and removal of unexposed (and to some extent the exposed) silver halides can be varied depending on the emulsion selection and monobath formulation. Higher temperatures upset this development-fixing balance because with increasing temperatures developer activity increases more than the fixer's activity. Generally, rapid processing monobath solutions tend to bring about a loss of film speed and contrast, and high fog level—but not necessarily a loss in what the engineers call "information content."

In compounding a monobath for

6 COMPACT PROCESSING UNITS

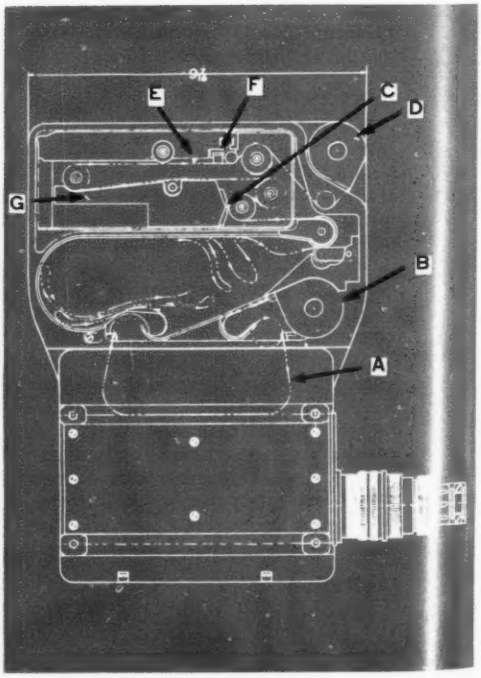


◄ Visicorder, Minneapolis-Honeywell POP paper unit: A. light source, B. collector lens. C. galvanometer lens. D. galvanometer mirror. E. recording mirror. F. recording mirror. G. recording plane H. band of light.



► Maurer system exposes and processes film in flight: A. path of film to focal plane. B. feed cassette. C. depositing slit. D. take-up cassette. E. squeegee. F. sponge. G. monopaste cylinder.

◄ Fairchild processor uses thickened paste to prevent spillage and a plastic coating to prevent crystallization of chemicals on films. Two-solution or monobath.



an emulsion which characteristically develops rapidly and fixes slowly, development rate must be decreased by using a developer which is slower, less concentrated or with a lowered alkalinity (pH) or the hypo concentration must be increased. Too much hypo, on the other hand, can lower the image quality by acting too rapidly on all the silver halide before the developer is able to effectively reduce the latent image to metallic silver.

Since each emulsion has its own developing and fixing rates, a monobath formula compounded for a specific type of emulsion could very well fail with other emulsion types. Reaction products liberated from the emulsion upset the development-fixing balance so the most efficient practice is to use a minimum of solution and discard it after a single use.

A very important feature of monobaths is that they are self-regulating. With the proper formula, the image is developed to completion and no further; thus it is impossible to overdevelop the image even if it is in contact with the film for much longer than the processing time. This is extremely important when critical timing of the processing is difficult or in systems which store the solution-laden film without a final wash.

Monobaths are applied to the film in solution or as a spray bath or as a thickened paste. (To insure against spilling the corrosive monobath, thickening agents can be added to the solution to give it the consistency of thick glue.)

For practical work with popular films, the following formula can be used for monobath processing:

Physical Research Monobath 438*

Water (120°F)	700ml
Sodium sulfite (desiccated)	50g
Hydroquinone	15g
Phenidone	10g
Potassium alum	20g
Sodium hydroxide	18g
Sodium thiosulfate	60g
Water to make	1000ml

Process at 69° F. Processing time for generally available roll films is approximately 3 min. or less.

Fairchild monopaste

A thixotropic thickening agent, exceptional in that it flows only under pressure, is used in the Fairchild monopaste formulation. A .002-in. thick layer of solution is applied to the film through an undercut applicator. The film passing through the applicator provides shearing force or pressure necessary to spread the monopaste. After a suitable processing time a plastic—very thin, transparent Saran—is laid over the emulsion for protection and to prevent solution's crystallizing on the emulsion. For higher film speeds, for wider exposure latitude and for use with a variety of emulsions, Fairchild, in one variation, uses separate thickened solutions of developer and fixer.

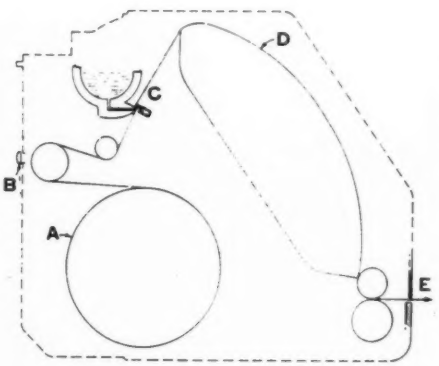
*Now Itek Corporation Physical Research Laboratories

Maurer processing machine

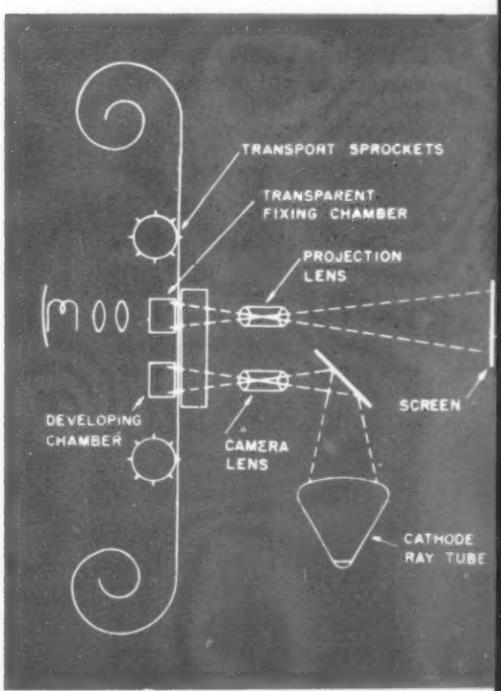
Another unit which uses a thickened monobath is the Maurer Processing Magazine for the KA5, 70mm aerial camera. Originally designed for reconnaissance work, this 8-lb. unit automatically feeds film into the camera, processes the exposures and winds the completed film into a take-up cassette during flight. Also using a thickened monobath is their KD5 which is designed to photograph, process and project a radar screen image in 1½ sec. Such rapid units not only provide an image easier to view than that

(*continued on page* 72)

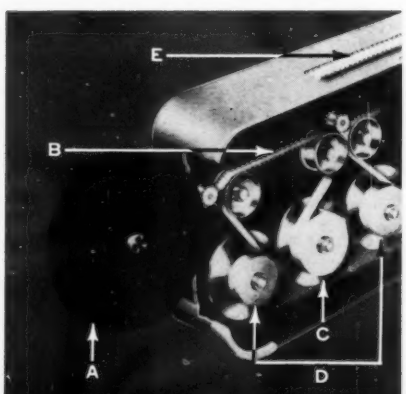
WITH SPLIT-SECOND DELIVERY



◄ Datarite Magazine: A. feed spool. B. light input from oscilloscope. C. capillary feed slit. D. heated platen which accelerates processing, dries emulsion and decomposes developing solution. E. output.



► U.S. Army Signal Research and Development laboratory unit does its developing during the exposure of the film, fixing during its projection. Courtesy *Photographic Science and Engineering, Oct., 1958.*



◄ Rapromatic unit uses a saturated web for application of monobath, developer or fix: A. film supply. B. film undergoing processing. C. solution feed roll. D. take-up rolls. E. processed film.

PRINTING TECHNIQUES WITH MULTI-CONTRAST

After nearly twenty years of trial, not without error, variable contrast papers have won their case. Today you have your pick of no less than eight. Here photographer M. Richard Marx reports his exhaustive tests with them alone and with Omega Timer, concludes: If you need No. 5 paper, try something else, otherwise they can't be bested.

When in 1940, Varigam, the first variable contrast paper, was introduced to the American photographic industry only two filters were available. Intermediate contrast grades were obtained by dividing the exposure between the low contrast yellow filter and the more contrasty blue. Variable contrast papers have come a long way in the past nineteen years.

There are now no less than eight different variable contrast papers available. While Varigam still remains the most suitable emulsion of all for contact printing, DuPont has developed a High Speed Varigam for those who prefer colder tones, and a newer emulsion, called Varilour, which is a high speed, wamer-tone paper, offering greater latitude and an ability to tone in all standard toners, single solution and otherwise.

Under license from DuPont, the Haloid-Xerox Co. offers three different papers: Varaloid, High Speed Varaloid and fast Varaloid Proof. Varaloid is considerably faster than its DuPont counterpart and all three papers have considerably more latitude than the former Varigam emulsion. The proof surface offered by Haloid is the only enlarging variable contrast paper selling at the price of less expensive contact emulsions, yet retaining all variable contrast characteristics. It has a rough surface suitable for pencil markings or notes.

The Eastman Kodak Co. entered the variable contrast field in 1957 with their Polycontrast and Polycontrast Rapid papers, wamer-toned wide latitude emulsions. Now also available in the United States is the Multigrade paper from Ilford of England, a highly successful emulsion long in use.

Contrast Chart: V.C. vs. GRADED

Variable contrast papers as compared to two brands of graded papers. Data is from test prints *(below)* made by author. Polycontrast paper, No. 4 filter combo had slight edge for highest V.C. paper contrast.

KODABROMIDE (Kodak graded paper)			1		2		3		4	5
VELOUR BLACK (DuPont graded paper)			1		2		3		4	
POLYCONTRAST with Kodak filters		1	1½	2	2½	3	3½	4		
VARIGAM with DuPont filters		1 2 3		4 5		6 7		8	9 10	
VARILOUR with DuPont filters	1 2 3		4 5		6 7		8	9 10		
VARALOID with Kodak filters		1	1½	2	2½	3	3½	4		
MULTIGRADE with Ilford 3-filter set	NO FILTER	LOW CONTRAST		MEDIUM CONTRAST				HIGH CONTRAST		

INCREASING RELATIVE CONTRAST →

Recent practical tests by this author were conducted under ordinary darkroom conditions and the results presented here are intended to serve as a working guide for the photographer, not as a scientific report.

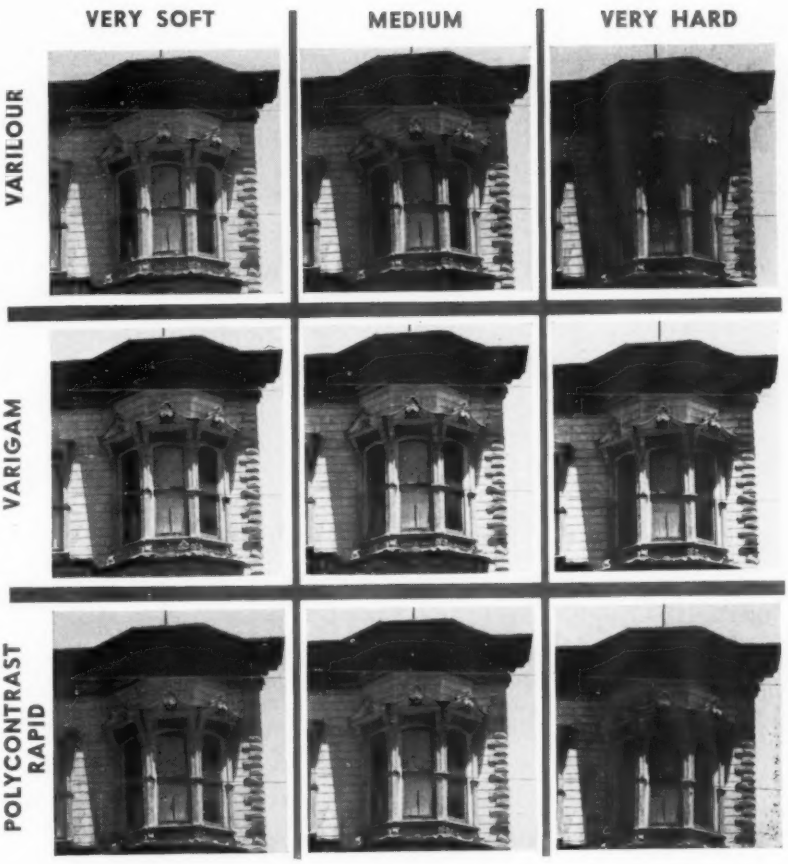
Two-diameter enlargements were made with an Omega D-2 condenser-type enlarger, of a Kodak Step Tablet No. 2 (grey scale), a portrait negative and a printed legend indicating the paper and filter combination used. The intensity of the enlarging light, without the negative carrier in place, was measured on the easel with a Weston Photographic Analyzer and checked and adjusted to give a reading of 10 meter candles.

Prints were made on each of the seven American variable contrast papers, first without a filter, then with each of the ten filters of the DuPont filter set and with each of the seven filters of the Kodak Polycontrast Filter Kit. Ilford Multigrade was first printed without a filter and then through each of the three Ilford Colour Filters. (Recently Ilford introduced a five-filter set, which was not tested.) To provide a speed comparison between graded and variable contrast papers prints were also made under the same conditions on DuPont Velour Black, Eastman Kodabromide, and Haloid Halobrome, using grade 2 of each. All prints were timed and developed for two minutes in D-72 developer, 2:1.

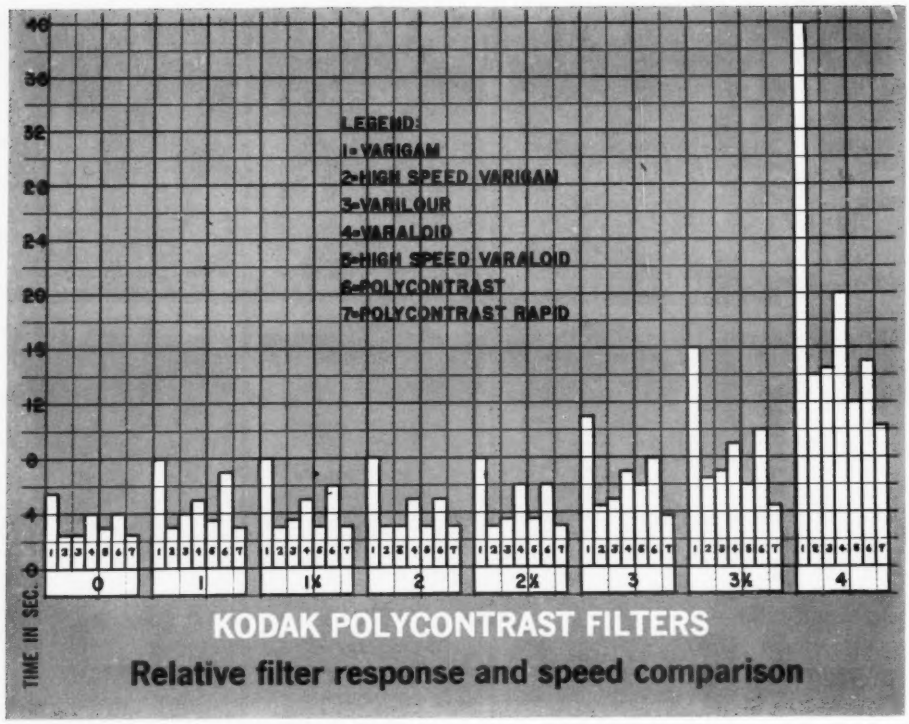
A series of exposures similar to the above was made with the Simmon Omega Electronic Variable Contrast Timer, exposing each paper through each of the three filter sets available (Omega for Varigam, Omega for Polycontrast and Omega for Polycontrast Rapid) and a series on Ilford Multigrade with the Omega for Multigrade filters. Since the timer contrast control knob is calibrated in nine steps, all papers received the same nine steps in contrast, with the middle (or No. 5) step being indicated as normal.

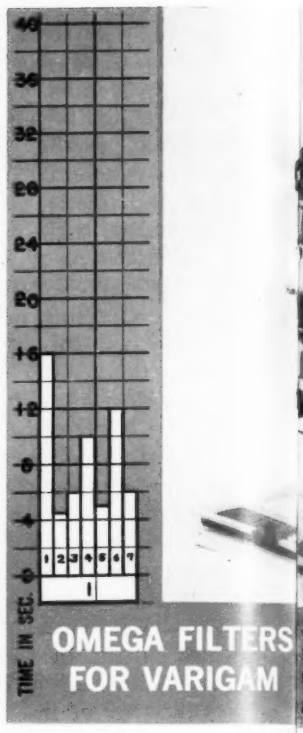
First it should be pointed out that both the filter sets, DuPont and Kodak, are interchangeable. They will work with all of the American variable contrast papers. In general somewhat more contrast (as well as shorter exposure due to greater light transmission) was possible with the Kodak filters. The softest prints may be made using Varilour and the DuPont No. 1 filter. This combination is several steps softer than a conventional No. 1 paper. The Kodak No. 4 filter when used in combination with Polycontrast or Polycontrast Rapid will produce the most contrast on the American papers; approximately equivalent to Kodabromide Grade 4. It does not approach that of the grade 5. While Ilford's Multigrade is designed to be used with its own filter set—this is the only set which proves entirely practical with this emulsion—it was found that with the DuPont No. 1 filter a high degree of contrast is produced. By dividing exposure between the DuPont No. 1 and no filter at all, various degrees of contrast can be obtained.

For those negatives where subject contrast makes printing on a single grade paper almost impossible, the variable contrast papers offer the ability to use multiple contrast in one print, by changing filters.



From soft to hard with two filters, used with three papers, illustrate the fact that variable contrast papers are more versatile even than many variable contrast users know. Prints for the above engravings were each made by the author by exposing three brands of paper with soft, medium and hard combinations on the Omega Variable Contrast Timer, equipped with filters for Varigam.





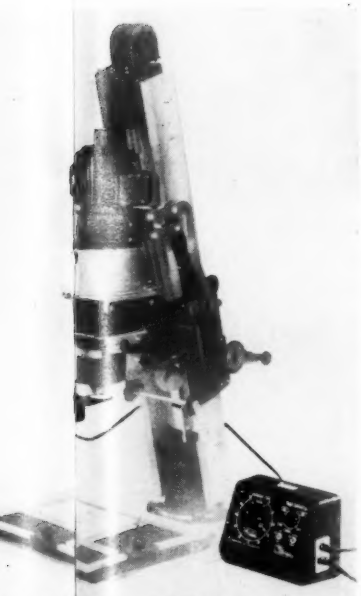
It seemed to me that those prints produced by dividing the exposure between two filters, automatically accomplished with the Omega Electronic Timer, were of a higher tonal quality than those produced with a single filter. It is a simple matter to make the normal exposure through the negative with the filter of desired contrast and then very briefly give a "dash" of light through the DuPont No. 10 or the Kodak No. 4 filter.

The variable contrast timer when used with the Omega filters for Varigam produces, in its automatic function, prints of equal density at any of the nine graded steps at whatever time has been selected as corect on *all* of the variable contrast papers (except Multigrade). Use of the Omega filters for Polycontrast while requiring an adjustment in exposure from the step No. 1 to the step No. 9 on the contrast control dial offers the same advantages of greater light transmission and more contrast as the use of the Kodak filters without the timer. When used with Ilford Multigrade the contrast control unit of the timer utilizes the Ilford high contrast filter and a neutral density filter and divides the exposures between the two electronically as with the Omega Polycontrast and Polycontrast Rapid sets, an adjustment in exposure is required when changing contrast.

The usual methods of developer concentration, that is, more dilution for softer prints, less for harder prints, may be used with variable contrast papers. For general work the usual 2:1 of any good standard paper developer is satisfactory.

Since these papers respond to the same chemicals and general treatment as conventional graded papers there are no special darkroom facilities needed. The safelight should be of light amber such as the Kodak Wratten OC or the DuPont S-55X. Either of these may be used with any of the variable contrast papers as well as with all conventional papers, contact and enlarging. None of the variable contrast papers is sensitive to red light, so in some instances a ruby light may be used, but is not advisable for judging print quality. All prints will apear more contrasty under a red safelight than they actually are.

No doubt there will be other variable contrast papers making their appearance in years to come. An even broader selection of surfaces and textures may then be available. Even at this time though there is little in the way of print quality or manipulation that cannot be handled more easily and less expensively on variable contrast. —THE END



Simmon Omega Variable Contrast Timer adjusts contrast, times exposure at the press of a button.

MARX'S SPEED COMPARISON

The material for the charts presented on these pages was culled from the author's experimentation with seven American multiple contrast papers currently on the market. In each case the charts show the exposure time necessary to make a print from a portrait negative and grey scale (illustrated on the previous pages) judged to be properly dense, with the filter and paper in question. The enlarger, developer and development time were kept constant.

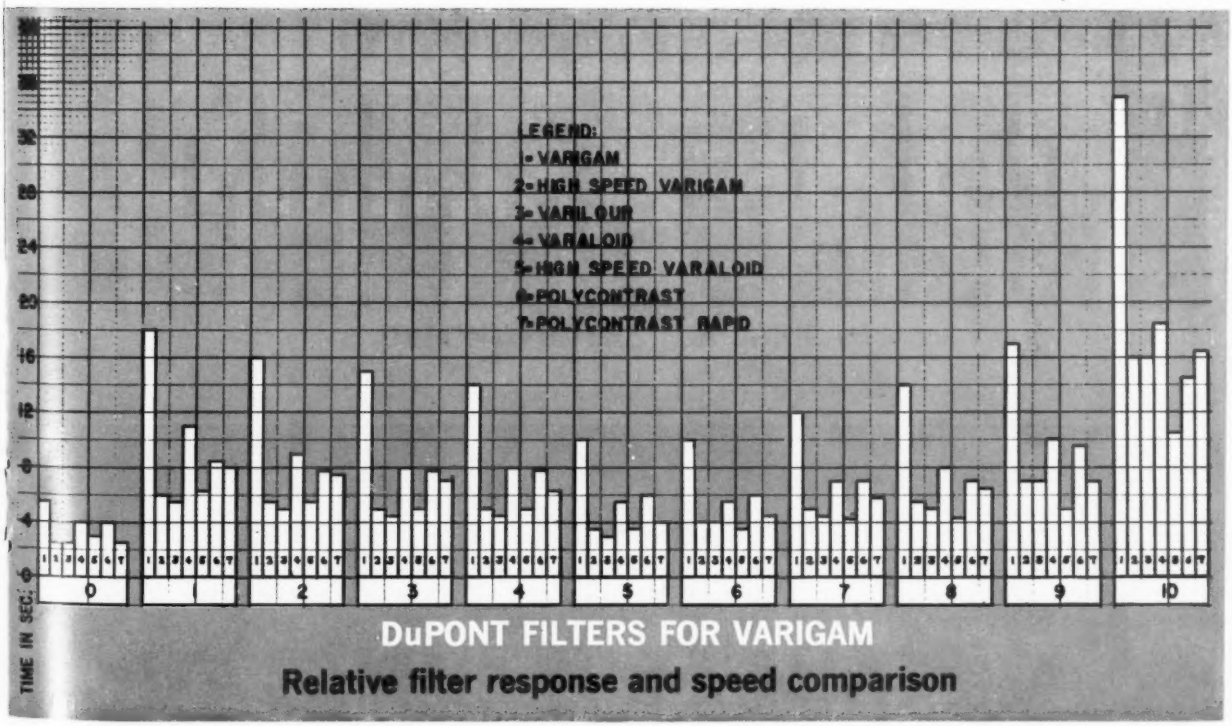
The graph at left charts the results with the seven papers used in conjunction with the seven Kodak Polycontrast filters—giving 49 exposure times in all. The longer the white bar, the slower was that particular paper when used with the filter whose number appears in the bottom row. The chart illustrates a fairly constant set of enlarging times up to the No. 4 filter, which, incidentally gives the highest contrast of the lot with Kodak Polycontrast paper.

The chart accompanying the picture of the Simmon Omega Variable Contrast Timer has but seven bars because, for any one paper, exposure time is identical throughout all the contrast steps. The device is also available with Polycontrast and Polycontrast Rapid filters and a Multigrade filter set (which is for use only with Multigrade paper). With these filters, the unit evens out paper response, but not to the point where exposure is the same for all contrast steps.

The chart for the American variable contrast papers when used with Varigam filters appears below.

Not charted is the response of Multigrade with the three-filter set, the newly-available five-filter set, or the Omega Variable Contrast Timer. The Multigrade system generally provides short exposures because the densest filter (for highest contrast) is a relatively transparent yellow. For lowest contrast you use no filter at all. Another unusual aspect of Multigrade paper is the fact that prolonged development results in *lower* contrast.

This is the exception to the rule that contrast increases with increasing development.

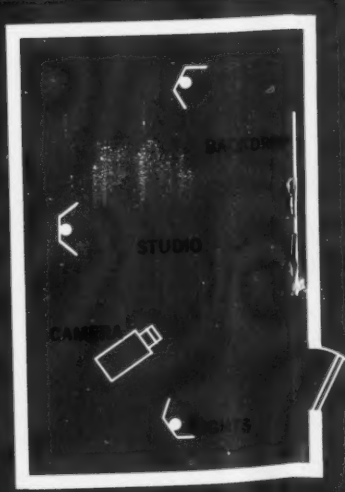


DuPONT FILTERS FOR VARIGAM

Relative filter response and speed comparison

SOCONY-MOBIL OIL COMPANY INC.

Posing in their stockinged feet to keep from soiling the background paper, Mike Angutl, Jack Brooks and Gordon Muth demonstrate the kind of consideration for the budget that's enabled them to put together a fine array of cameras and one of the best designed darkrooms in the U. S. Secret of working together at close quarters, says Mike, is to concentrate on results, leaving methods to the individual.



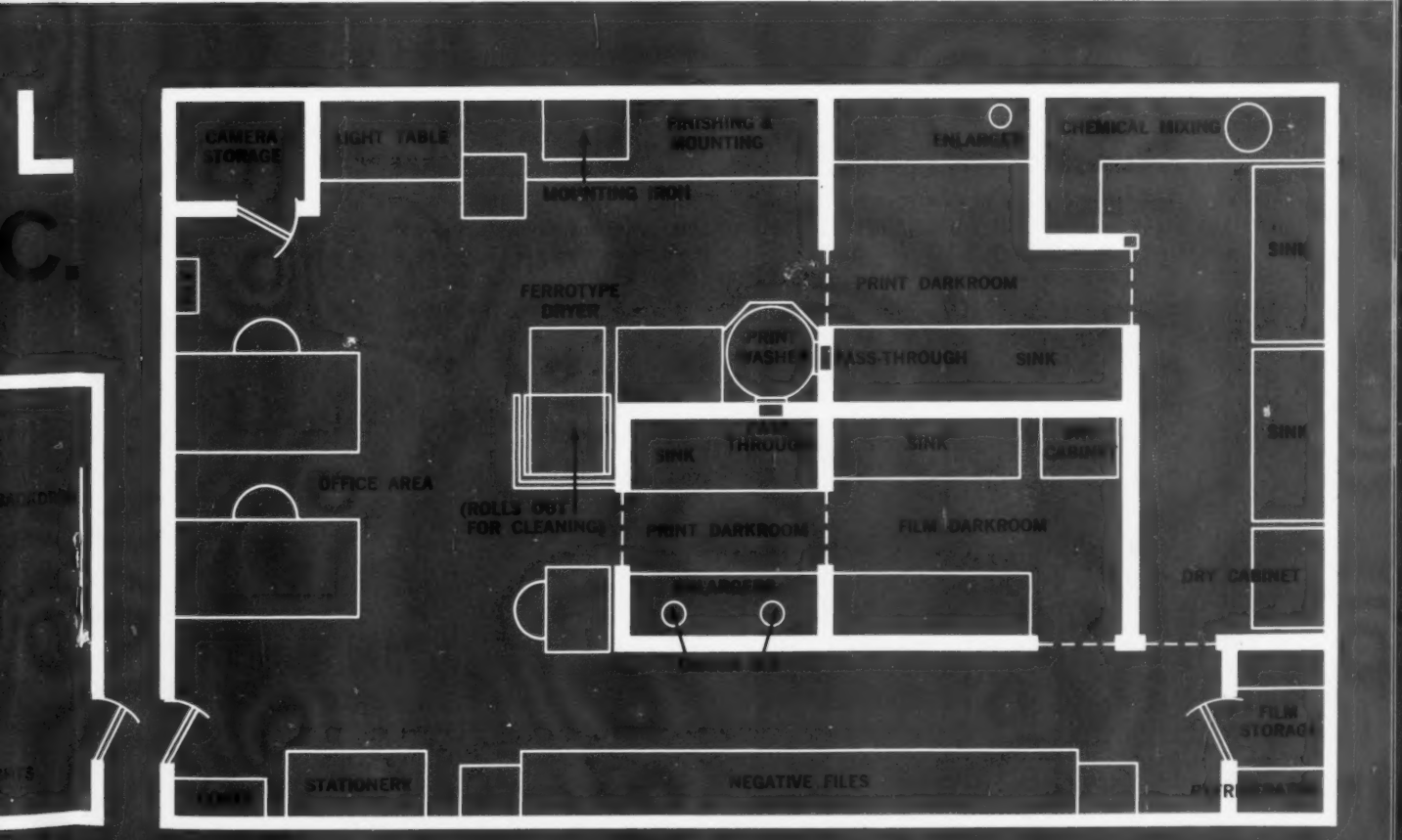
"They told us Summer was the slow time," says Mike Anguti, top man at Socony Mobil's streamlined New York photo lab, "but it hasn't been that way yet. We haven't noticed *any* slow time."

Mike and his two associates, Jack Brooks and Gordon E. Muth turn out an average of 15-16,000 prints a year, and the number of assignments they are down on the books as handling hovers around the 350 mark. This figure, though, is pretty misleading, for whenever possible they "package" their jobs by locations, and what appears in the records as one assignment is actually a group of jobs in the same location. Last year the staff collectively spent 375 days out of the office on location, and the places they worked reads like a train announcer's nightmare.

Since the work is so varied and much of it is carried on far from home, autonomy and individuality are the mottos. The lab is designed so that each man has a complete layout to himself. When coming in from an assignment, each man sees his own job through from the development of the negatives to the mounting of the prints, at least the first time round. The variety of the work and the intricacy of the company lead Anguti to prefer company staff to outside photographers.

He knows all about it, for he came from the outside himself. He was freelancing for Socony Mobil when, in 1946, they decided to set up a photo department of their own. For a while he was the whole show, and his equipment consisted of his own cameras, a 2¼ x 2¼ enlarger, and a 4 x 5 enlarger. The work load grows by about 12 per cent each year nowadays—thirteen years ago it mushroomed even faster, and Anguti found himself adding staff and cameras with no significant improvement in the lab facilities.

This changed when the company moved from the financial district to a shiny new building in midtown. For months before the move Anguti conferred with company officials, architects and other in-plant men, to evolve the perfect darkroom for his needs. After the plans were drawn up they were submitted to the major film companies for suggestions, additions, and comments, but the plans were so complete that there were none



forthcoming. It is significant that in the 2½ years the new lab has been in operation, only two very minor "bugs" have turned up.

To begin with the equipment list, it must be noted that it is policy to keep only "live" equipment. Anything that doesn't get enough work to warrant its upkeep gets traded in for an item that will turn out work. Currently getting the boot are an 8 x 10 portrait camera ("It's an excellent piece of equipment if you need it. We don't need it.") and a fine 35mm ("Too precision. Our cameras have to be able to take it.").

Even without these two, the roster of cameras is pretty impressive: 5 Rolleiflexes, 2 Speed Graphics, a Crown Graphic (all 4 x 5), a 5 x 7 Eastman View with 4 x 5 back, a Linhof Model IV, a Graflex 22, and one each Contax, Pentax, Exakta, and Canon, plus a Bell & Howell 16mm. All except the Rolleis have a full complement of lenses: normal, wide-angle and telephoto.

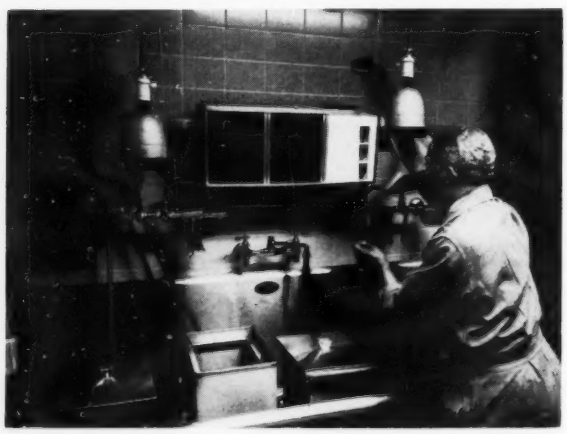
The physical facilities for processing are strictly de luxe: floor-to-ceiling pale green tile and gleaming stainless steel.

Morale is never forgotten; the Socony Mobil staff are perpetual contest-enterers, and have carried off awards in the Graflex, the P.P. of A. shows, and others. "It keeps you on your toes, always trying to make the shot that'll take the

LAB IS TILED, STAINLESS, SPOTLESS

Mike, on phone, takes charge of administration. Behind him is Jack Brooks at built-in light table, while Gordon Muth operates dry-mounting press.

Enough equipment for everyone to work at the same time was principle of darkroom design. Staff is never more than arm's reach of a phone: saves steps and tempers.



Stainless steel and temperature control make for efficiency. Extra-length negative drier was designed for lab, later Oscar Fisher added version to his regular line.

Drum drier makes use of otherwise waste alcove under girder. Casters make it easy to roll out for cleaning. Darkroom beyond print washer is Anguti's private one.

prize," says Mike. Proud of their work whether or not it brings home any loving cups, they make use of the office walls for display.

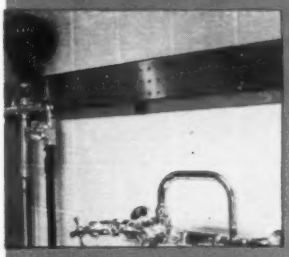
Directly behind the office area is the equipment closet; next to that a vast built-in light table used for showing and editing transparencies, and next to that the mounting bench, where the hot press lives. One of the largest made, this too is a device that has paid off in usefulness. When the photo operation began, an 11 x 14 was considered a big print. Now that the company is learning more about how effective pictures are in getting a message across, 16 x 20 is the size preferred for display.

For large print orders—anything over about 100 prints—Anguti has found that a multiple print house, with roll paper and automatic printers, can turn out the work faster and cheaper, leaving his staff free to do less mechanical work. They will sometimes enlarge 35mm or 2¼ x 2¼ negatives onto 4 x 5, mount the prints four-up, and let the outside house make an 8 x 10 copy negative.

For their own developing it's every man for himself. A devotee of inspection-development, Mike has passed the technique on to Jack Brooks and Gordon Muth—("Anyone who says miniature negatives can't be developed by inspection is welcome to come around and watch me")—but each man has his own pet developer. There is unanimity about Edwal Commercial Paper Developer, which they all use for prints, and all like PRA, but Isodol, Microdol and Promicrol are always handy too. A glance at their supply closet also disclosed 55D, Normadol, DK50 Ethol UFG, and Dektol, as well as Hunt's Flash-o-Graph hardener, Edwal Anti-scratch Hardener and Pak-O-Sol. Also a Time-O-Lite contract printer which is hauled out to one of the printing rooms whenever there is work for it to do. They use numbered paper grades (Kodak, Ansco and Defender!). This is not because of any deep-seated prejudice against the variable contrast materials, but because they've been too busy to work out a routine for using the new stuff. They've got the paper and filters, but lack the time to experiment with them. In the same way, they would like to do their own color processing, and have the chemicals, but need a few days when the work load lightens before they can get the set-up into production. Now their color is done outside, but when they get it back they don't just turn 35mm transparencies over to the division that requested them. They have a Viewlex projector and a 40 x 40 Raven screen. After they've done a 35mm color job, they set up the studio as a little theatre and *show* the client his pictures projected. Creates a tremendous amount of enthusiasm, helps get some respect for the photographers, and gives the pictures the best break.

FOR EFFICIENCY

PLUG IT IN, HANG IT UP—OR BOTH



Continuous stainless pegboard and outlets every 18 in. make entire lab area immediately adaptable to installation of new equipment, also help "clear the decks" when extra-large jobs are on hand.

CHEMICALS ARE THE CARRIAGE TRADE

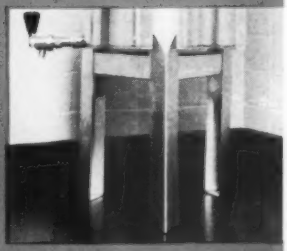
Dripping solution bottles don't mess Socony Mobil floors; they are always transported in custom-made stainless trolley. All stainless used in lab is, of course, resistant to photographic chemicals.

EXHIBITION PRINTS IN THE GROOVE

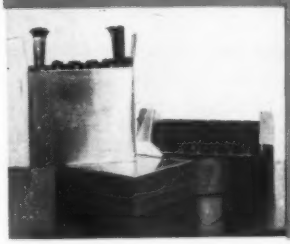
Custom aluminum moldings have slot just deep enough to accommodate double-weight paper on double-weight mat board; make exhibiting 16 x 20 prints in changing display quick and easy.

LEGS MAKE MIXER RISE AND SHINE

"It's a simple idea, but it's saved us a lot of steps and a lot of cleaning up," says Mike Anguti of this tripod stand for the chemical mixer. Bottles fit under tap, machine doesn't require table edge.



FOOLPROOF TANK FILM PACK HANGER



Rudman & Scofield film pack hangers are lab's pet gadget. Made by ricators, they are little New York stainless fab- known; impressive in operation.

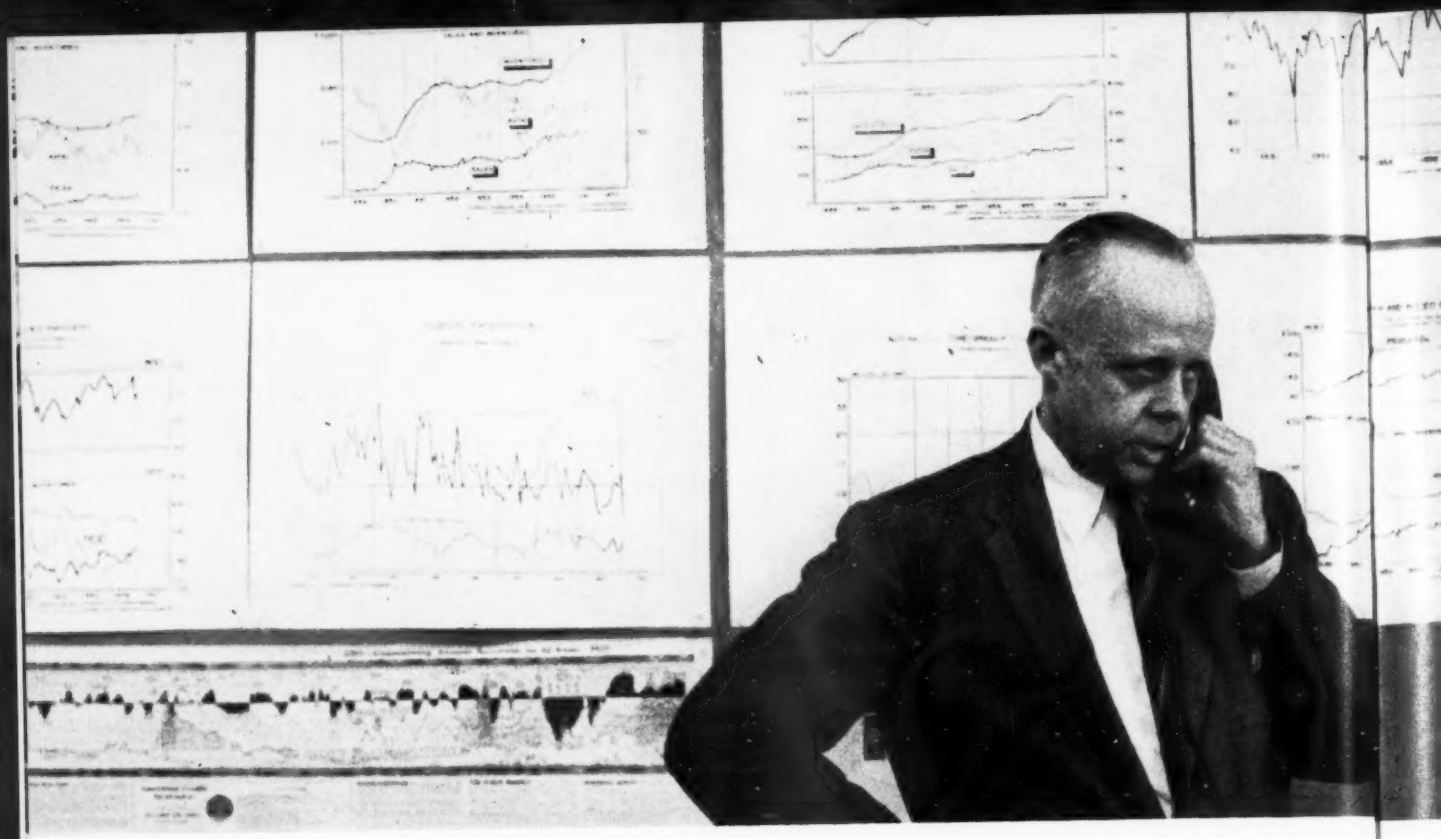
Heavy industry via light camera is represented in these three 35mm pictures assigned by Cyanamid Magazine. Werner Wolff of Black Star agency photographed the aftermath of an explosion (above) for a story on dynamite. Alum truck driver *(top, right)* along with each of his 30 co-workers at a Hamilton, Ohio, plant, was portrayed by Bob Goodman for a highly successful local exhibit. Tank car picture by Archie Lieberman, Black Star, part of company-wide anniversary photo survey for the magazine, was used in an employee handbook.

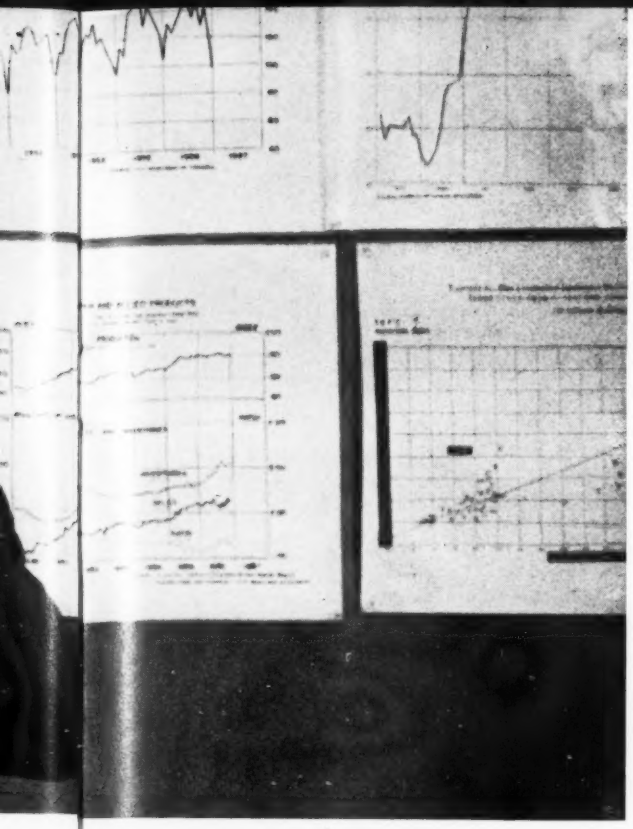
PORTFOLIO NO. 12

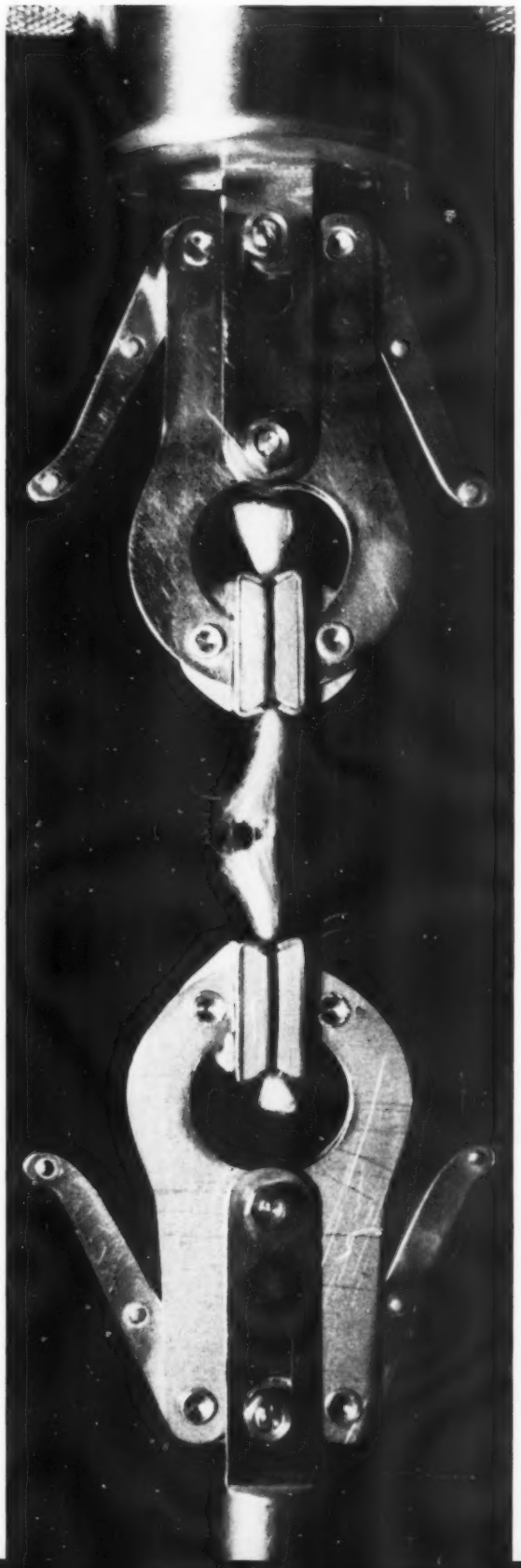
Editors of American Cyanamid Company publication insist on photographs that stop — and fascinate — their readers

The Cyanamid Magazine is no typical house organ. Edited by men who made their mark in the mass circulation magazine business, it is a highly professional quarterly. First editor Tom Stanton, art director Leonard Jossel and present editor Mark Strage convinced management that magazine style photography would be a step forward in giving employees a clear and fascinating idea of company operations and policy. Photo jobs usually fall to magazine freelances, who are on their own once they hear what the story's about. "Because he has it from the start, or because he is forced to pick it up in working for the magazines," says Strage, "a photo-journalist has a built-in reaction to what he sees. It shows in the prints. It makes the reader react." Photographers average two to three days on a picture story.

They usually work with 35mm cameras, although technique is entirely up to photographer and is rarely discussed. Photographer turns in as many contact sheets as he feels are necessary to cover story completely.







Production, sales and business activity charts surround the working quarters of Cyanamid staff economist Ralph Burgess *(above).* Black Star photographer Werner Wolff made picture using a 35mm camera and existing illumination. Burgess was hardly unaware of the camera and photographer, but the system of making many pictures quickly and unobtrusively succeeded in a study that is arresting and convincing as well.

Trying to sleep *(left),* Cyanamid worker, Pat Yanacone, was photographed in home during the afternoon by Carroll Seghers II, to round out a story on the night shift—an important part of the Cyanamid chemical operations. To be interesting to people, the photographer must inject the "human equation" into his pictures, says editor Strage —who looks for photographers able to show relationship between people and surroundings.

Concrete demonstration *(right)* of company procedure in the matter of quality control was worked out between Cyanamid Magazine editors, company technical experts and photographer Martin Iger. It is one of the few pictures made on large format cameras run in the magazine. The editors point out, however, that they never express a preference for one technique or another. That's the photographer's business.

Girl lab technicians *(right)* dainty despite man-from-Mars get-up, were photographed by Martin Iger as part of Cyanamid's anniversary coverage, which consisted of turning photogs loose in plants. Pictures made nucleus of photo library.

Stock picture in more ways than one *(below)* this was made by J. C. Allen of A. Devaney agency, bought from files. Stopping power of pigs slammed home point of Cyanamid's Aureomycin story: that today's farmer can produce food for himself and 18 others—more if necessary—while conserving natural resources and putting them to better use.

Sale in the making *(right)* is sample of extensive photo coverage in Cyanamid Magazine section on the marketing of company products, most of which do not go directly to consumers. Used here, it is a section of a 35mm negative. Selection of pictures is done from contact sheets—which don't leave public relations office. Picture stories are submitted for final approval full size, in layout form, so their purpose is apparent and they can be seen without magnifying glass. Picture by Joe Covello.

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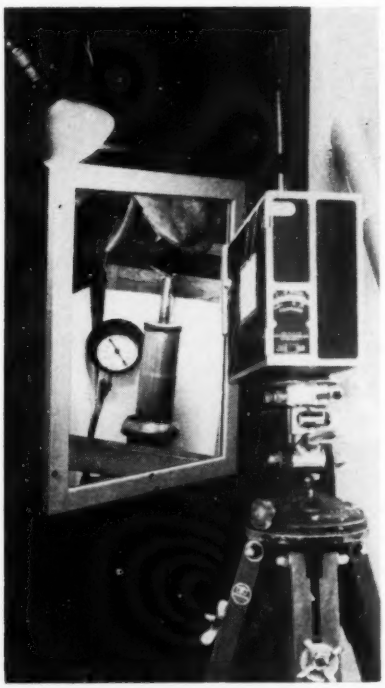
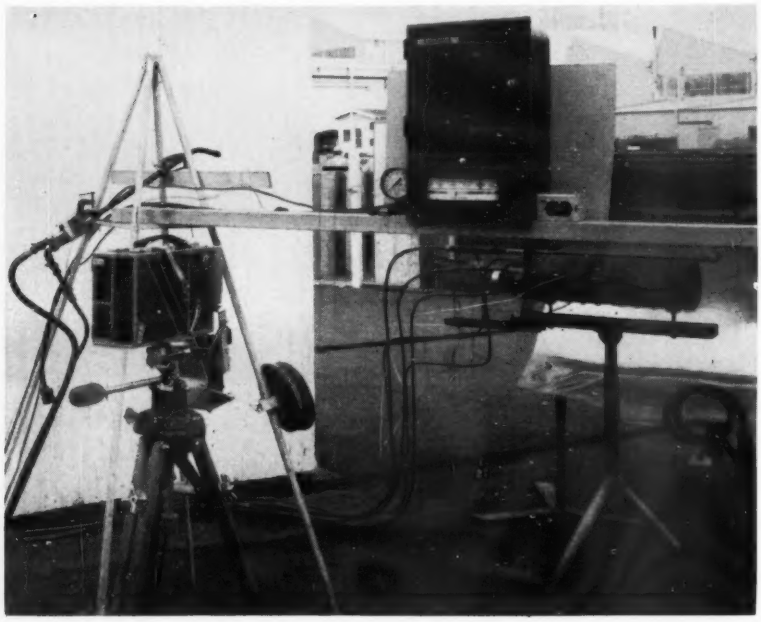
PHOTO PLUS INGENUITY = INSTRUMENT

Photography's job in instrumentation is to measure things that elude other recording devices, the five senses and the span of human comprehension. Author Gene Lyle, photo chief at Ruhr Aircraft, points out why the challenge of this fast-growing application falls to the photographer, and tells what he needs to meet it in the way of knowledge, equipment, and creative thought



Out of danger, motion picture camera "sees" and records mirror image of cylinder about to be pressurized till it explodes. Gauge will tell tale.



◄ **Plank** loaded with bank of instruments and a facsimile aircraft exhaust manifold undergoing tests is example of subject modification. Film from 16mm camera brought mountain of data to engineers: the event, timing, pressure and temperature.

"Photographic instrumentation" is a loose name. It boundaries are not clear cut. It means one thing to a physicist, another to a production man. These two men do not speak the same dialect. It is up to the photographer or the engineer, or whatever label the photographic instrumentation specialist bears, to become interpreter. He can be useful to each of these experts.

Perhaps as good a definition as any of "photographic instrumentation" is this: "The photographic recording of a subject or event for the purpose of measuring some aspect of it."

The thing to be measured is either invisible, or happens at a pace beyond the realm of human concentration.

It may be heat distribution in a furnace, or the angle and configuration of an ultrasonic shock wave. It may be the flow of traffic out of a company parking lot, or the growth of oxides on a steel girder in a saline atmosphere. It could be the bounce of a router as it bites into Kirksite, the distribution of shock to a drophammer head on impact, or the relation of an aircraft's altitude, airspeed and attitude to the fleeting trace on a radarscope.

The only thing shown may be a bank of instruments, so that they may be later studied and correlated at leisure. Or the instruments and the event may be shown simultaneously on the same film. Or only the event itself may be shown, with no instrumentation other than the photographic record.

Many people in aircraft research and development will recall a spectacular example of photography providing the only clue leading to a solution. It happened some years ago during National Advisory Committee for Aeronautics studies of crash fires. Obsolete airplanes were crashed between posts set up on the runway. They were crewless, but wing tanks contained 1,000 gallons of aviation gasoline dyed bright orange. Motion picture cameras loaded with color, set at five times normal speed, recorded each crash in slow motion.

One was a puzzler. As the aircraft crashed the posts at about 90 miles an hour, fuel sprayed from the ripped tanks. But fire did not occur at this instant. Momentum carried the torn hulk 100 ft. or more before a flaming explosion enveloped it.

Recording instruments and the consensus of trained observers offered no clue as to why the explosion was delayed. The answer might be important if it could point the way to preventive measures.

Photos supply the clue

The clue came from the motion pictures. Engineers watching the slow motion projection, saw a wheel strut break away from a wing and tumble through the air behind the aircraft. As it struck the ground, a patch of flame leaped up, flashing along the path of spilled fuel to the aircraft itself. From this knowledge, provided by photography, evolved a partial solution for crash fires from such causes—a device for eliminating static electricity that might ignite fuel spilled from the tank in a crash.

Another fact was obvious in NACA's studies; wing tank fuel sprayed over hot exhaust manifolds in a crash contributed to the fire hazard. One preventive approach was to install a quenching device on the manifolds.

Streak photo by author gives engineer the facts about seam welding machine. Auto spark plug flashes 120 times per min. *(at bottom)* establishing time. Ruler tells distance. Streaks show welder's speed and smoothness. ▲

By facsimile

Rohr Aircraft's home plant in Chula Vista, California, contracted to make tests. A facsimile exhaust manifold was heated to operating temperature, aviation gasoline sprayed over it, and various quenching devices tested. Engineers wanted the photographic instrumentation to show simultaneously the event, the temperature of the manifold, the psi of the quenching lines and time required for quench.

A simple but completely effective rig was built for all of this by Rohr's engineering laboratory. A 2 x 6-in. plank was supported between camera and manifold, and above the field occupied by the manifold in the camera's viewfinder, and the instruments were attached to the plank. A standard pressure gauge gave the psi reading. A thermocouple on the manifold fed temperature information to the dial of a Wheelco. A laboratory timer cali-

brated in tenths of a second gave the time. Exposures were made at 64 fps in a Cine Special.

In selecting the technique for a given job, the photo instrumentation specialist must have information on several factors.

Keeping within the budget

First, perhaps, is the customer's budget. Will the answer be worth the cost of the most efficient approach? If not, perhaps a second-choice technique will suffice.

A Monterey, California, sardine cannery wanted to know why one girl was the fastest packer in the industry. It was suspected that in some way she packed sardines into a can with fewer motions than anyone else.

They tried to get her to hold one position at a time for photographs. Her hands trembled when she tried to stop them, straining to rush on automatically to the next movement She could not remember exactly what the next movement was. It always seemed awkward, and everyone knew it wasn't quite right.

The logical technique for this job would have been motion pictures shot at around 400 frames per second. But a camera capable of this speed was not then available in Monterey, and renting one out of San Francisco or Los Angeles would have cost more than the cannery was willing to pay. So streak photography was substitued.

Penlight bulbs were taped to the girl's fingers, a time exposure made while she speeded uninhibited through a packing cycle. Though not as clear as high speed motion pictures would have been, the light streaks were traceable. They showed that this girl went through exactly the same motions as the other packers, just faster and smoother, with no hesitation or false starts.

Sometimes streak photography renders better data than motion pictures. A California aircraft plant has a large automatic seam welder whose head travels on overhead tracks. It was known that the traveling head sometimes hung up momentarily, causing the electrode to jerk and make an uneven weld. To determine just where this happened and for what interval, an automobile spark plug was attached to the electrode holder. A timing device triggered a spark 120 times per minute. Travel distance measurements were indicated with an ordinary whiteface yoyo taped to the welder bed. Time exposures on still film provided the desired information in more easily read form than any other method.

How fast?

Another factor that must be known in deciding the technique to be used is the subject's speed and the elapsed time of the change to be studied. Is it a matter of weeks, or of microseconds (millionths of a second)? Can the change best be shown in motion, in a still as with streak photography, in a number of superimposed exposures on a single still as with Harold Edgerton's multiflash technique or with a number of adjoining exposures on a single still as provided by the Fairchild sequence camera?

Directly related to rapidity of subject movement is the speed at which each exposure must be made in order to show the detail the customer requires. If the motion is slow, the factor has such latitude as to be unimportant. Naval Electronics Laboratory in San Diego is currently making time-lapse studies of the movement of slicks across the ocean surface, using a 16mm Arriflex with shutter speed of ½ sec., and intervalometer set for exposures several seconds apart.

If the motion to be studied is rapid, a formula may be applied to determine the allowable maximum exposure time, else the subject image may be so blurred as to be worthless.

This applies to either still or motion picture techniques. In this work motion pictures are often used as stills, studied a frame at a time in motion analyzers such as the Bell & Howell 206-M or 173-BD, or the intricately calibrated Vanguard or Telereadex.

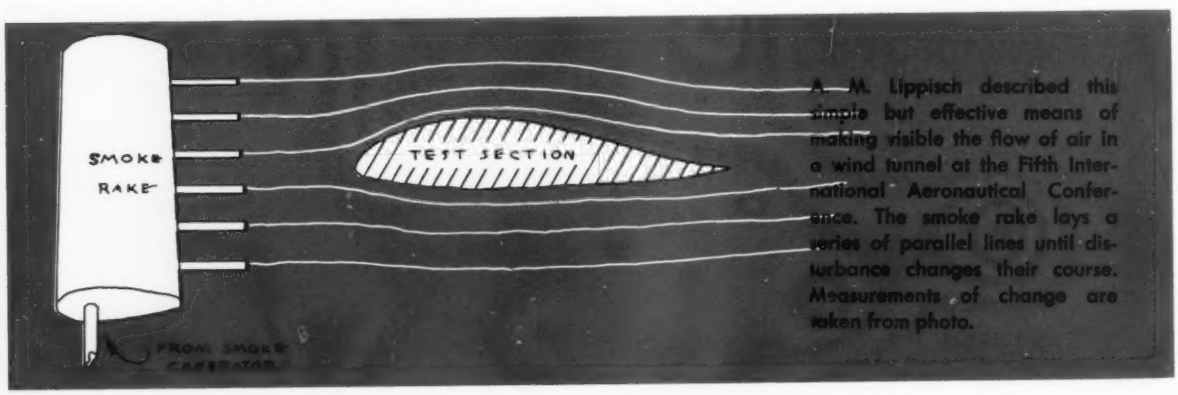
The subject must travel across the field no more during each exposure than the distance of allowable resolution on the film. If 50 lines per mm is allowable, then the distance of image travel must be 1/50mm or less. This is affected by: 1. Angle of view of the lens (focal length) 2. Distance of subject from lens 3. Direction of subject travel 4. Speed of subject.

Know the nature of the event

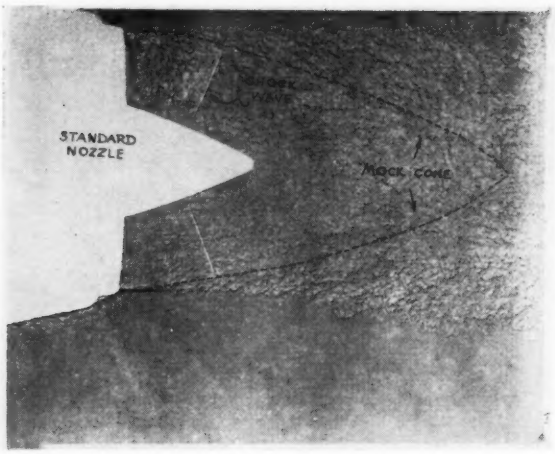
There are other elements the instrumentation photographer should know before he can properly set up for a job. What is the nature of the change to be studied? Is it disintegration, growth, compression, ex- or implosion, skip, bounce, fluid movement?

What are the variables to be recorded? Time, pressure, strain, temperature, current, position in space? Are fiducial markers to be included?

What is the direction of the subject movement? Whether it is a



A. M. Lippisch described this simple but effective means of making visible the flow of air in a wind tunnel at the Fifth International Aeronautical Conference. The smoke rake lays a series of parallel lines until disturbance changes their course. Measurements of change are taken from photo.



Shadowgraph, a positive print of an 8 x 10 negative made by the author, with equipment also made by himself, required no wind tunnel, took only minimum outlay of cash and furnished just the answers needed. Picture shows exhaust from Ruhr model jet engine data is inked on print.

Setting up his shadowgraph paraphernalia (at night to avoid extraneous light) author leans over film holder, an 8 x 10 camera back fronted with a sheet of heat-absorbing glass. Horizontal cylinder is model jet engine. Box *(center, left)* supplies high-voltage spark light, made necessary by speed of event.

router revolving at 18,000 rpm or a rocket traveling lineally at 18,000 mph makes a world of difference in just what equipment is to be applied to its study.

This seems self-evident, yet it is not to the average customer inexperienced in photo instrumentation. A phone call from a new engineer may go like this:

"Joe, hop down to the test stand with your Fastax. Load it with infra-red. We'll be ready in fifteen minutes."

It turns out that what he wants to see does not emanate in the infrared spectrum, that a still schlieren will give him the measurements he wants, and that it can't be set up from a standing start in 15 minutes.

Like a plumber, the photo instrumentation man knows his tools better than anyone. But a lot more amateurs dabble in photography than in plumbing, and a lot of these feel impelled to tell the instrumentation man what tools to bring, but not what the job is. It is always gratifying when the customer takes you into his confidence at the time he dreams up a problem.

Tools of the trade

There is a rapidly growing amount of commercial equipment for photo instrumentation work available over the counter on either a rental or purchase basis, and there are a number of individuals who own some equipment and contract their services by the job. Cameras, in dozens of specialized models, are packaged by Traid, Gordon Enterprises, Flight Research, Beattie Photo Sonics, Eastman, Wollensak, Beckman and Whitley. You can order a high speed job, often by return mail, that will run anywhere from 32 fps to 4,300,000 fps. Specify it, and if it is worth the cost to you, you can get it. If they don't have it, they will build it for you.

Another amazing field within photo instrumentation is that of optics—wide angles with high resolution at 165° coverage, long affairs for use on tracking cameras, telescope systems—things way beyond the production capabilities of the average do-it-yourself industrial shop.

Timing devices, intervalometers, light sources for most jobs, can be produced by some industry shops, but it usually is still economical to buy them from a house that does nothing else. For instance, it is not too difficult to build a Kerr cell shutter, once you research the subject. But if you want the shortest possible time—and the only reason for using a Kerr cell is to obtain a short exposure time—the problem grows complicated. You can buy one over the counter from Electro-Optical Instruments, Inc., in Pasadena, Calif., that will expose for as brief a period as five billionths of a second.

Subject modification for the purpose of photography was mentioned earlier (dyeing gasoline), and this is a field that has produced some ingenious devices. Hardly a job comes up that some modifications aren't made for visibility and measurement.

Subject modification

A neat one is the trick of taping ribbons in lines across the wing of an airplane. The camera is mounted high in the tail where it has an excellent view of the wing in flight, and the patterns the ribbons form in the slipstream show graphically the flow of air over the wing.

Another is a wind tunnel smoke rake described by A. M. Lippisch, of Collins Radio Company, at the Fifth International Aeronautical Conference. It is a device that emits streams of smoke that flow in straight lines in the wind tunnel until they meet an airfoil model or other object. The patterns these smoke lines form around the interference are as clear as though an artist had drawn them with pen and ink.

There seems to be a general impression that shadowgraph and schlieren photography are only for the ballistics physicist in his laboratory. The principle of schlieren has been known for a hundred years. Shadowgraph, one of the simplest of photographic instrumentation devices, has been in use for nearly

(continued on page 74)

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by LLOYD E. VARDEN

PHOTO METHODS FOR TOMORROW

Newly-published N.M.A. report is compendium of microfilm progress

In 1958, the Seventh Annual Meeting of the National Microfilm Association was held in New Orleans. The *Proceedings* of this meeting have recently been published, making a convenient source for learning about recent developments in the microfilm field. It also allows one to take a peek at possible future developments and trends as expressed by leading members of the N.M.A. I'll discuss some of the content here.

Microfilm recording is almost as old as photography itself, but its commercial application on a more or less large-scale basis was slow in coming. In this sense it is roughly 30 years old; a young industry indeed. Yet, Mr. Joseph F. Curtin, in his keynote address at New Orleans, expressed amazement that so many safes, vaults and filing cabinets are still manufactured for storing paper records when microfilm records have the advantages of lower cost, greater economy in storage space, etc. He stated that in 1954 the volume of sales of microfilming equipment amounted to but 6.3 million dollars. Of course, this represents only a part of the total volume of business in the microfilm service field. Nevertheless, microfilming has not been adopted nearly as widely as its well-established merits justify. Mr. Curtin believes that microfilming has to be advertised and promoted before the industry will be elevated to the level it deserves.

Contrary to popular beliefs, most microfilm work is done in connection with active functional file systems. The necessary storage life of the images may be anywhere from a few years to fifty or more years. Long term, or "dead record" archival storage, is important in many areas of the microfilming industry, but the fact remains that for numerous applications rather short term life is adequate. This is true in the case of microfilming in color, which Mr Edward H. Cann discusses fully.

The working principles of the xerographic process are known well enough to readers to need no repeating here. But there are many present and future applications of the process not widely known. Mr. D. L. Clark enumerated the general advantages of the electrostatic recording method and then described various potential extensions of it, some of which are currently under investigation.

Micro-xerography

A xerographic printer has already been developed that can record 10,000 characters per second or 5000 lines per minute. This printer is a marriage of a special cathode ray tube made by Stromberg-Carlson for displaying output data from an electronic computer and a xerographic printer similar to the Haloid-Xerox Copyflo machine. The next logical step, according to Mr. Clark, is to use such a device for facsimile work and the recording of images from cathode ray tubes generally.

For printing magazine address labels, xerography has a great potential future. From day-to-day new subscribers are added to subscription lists and delinquent ones dropped. *Sports Illustrated*, in collaboration with IBM, has developed an experimental electrostatic printer that turns out revised sets of mailing labels, rapidly and inexpensively, from punched cards.

Progress has also been made in adapting electrostatic recording in oscillography. The image is invariably black on white in this application, but the image can be in almost any color desired. It is expected that multicolor line images for layout drawings, circuit diagrams, etc., will be produced by xerographic means.

Mr. Clark considers the possible applications of xerography almost unlimited in the various image recording and reproducing fields. Here are just a few further uses he expects will

There's no such thing as an ordinary assignment

No one *wants* to do an *ordinary* job, regardless of the assignment. This is why Kodak has gone to some length to provide materials that solve the technical problems while *you* solve the creative ones! Roll films, for example. Here's a list of the most-used ones, each tailored for the extraordinary job.

Tri-X—Excellent when working with models or subjects requiring short exposure. Fast, long-scale, moderate contrast. Working index—500.

Royal-X Pan—Almost 4 times faster than Tri-X (given equal development). Working indexes of 1600 to 6400, with increased development.

Panatomic-X—Very fine grain, moderate speed. Preferred when extreme detail or texture is desired, or for mural-sized blow-up.

Plus-X Pan—35mm only. General purpose, fine grain, wide exposure latitude. Makes good enlargements.

Verichrome Pan—General purpose, indoor-outdoor film with wide exposure latitude.

Kodacolor—Balanced for both artificial and daylight. Produces ideal color negatives for extreme enlargement.

Ektachrome—Fast, color-reversal film. Rolls and *sheets* for both artificial light and daylight.

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develop: template production in the aircraft industry, production of offset printing plates for high quality halftone work, continuous tone printing from photographic negatives, production of raised images for embossing leather and other materials and possibly for Braille printing, microfilm printing on any appropriate support, direct printing at extremely high speed for daily newspapers, direct camera photography for making identification badges, drivers licenses, etc., and even continuous tone color printing from negatives or positives.

Kalfax microfilm duplication

Dr. Floyd T. Neth described the Kalfax process as a new concept in photography in that the image densities are the result of light scattering rather than light absorption. After exposure of a Kalfax layer to near ultraviolet radiation, the application of heat causes the products formed in the layer during exposure to produce millions of microscopic scattering centers per unit area.

The image appears white or cream colored when viewed by reflection, but by projection the image is black.

Fixation is accomplished by exposing the layer overall at a temperature below 110°F and then allowing 3½ hours for the latent image to decay. The latent image is unstable and decays at a finite rate, depending upon the temperature. Therefore, heat development of Kalfax microfilm material (at 225°F) should follow immediately after exposure. Only 2 sec. are required for development.

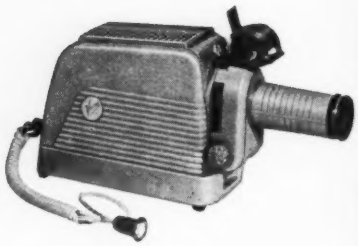
The speed of Kalfax material is the same as the highest speed diazo materials. Resolutions of 80 to 120 lines per millimeter are obtainable routinely, and with special exposure and development conditions the resolution can be as high as 500 lines/mm.

The developed and fixed Kalfax image, according to Dr. Neth, is the most stable of all photographic images. It is unaffected by water, light and most solvents under all storage conditions up to temperatures of 160°F.

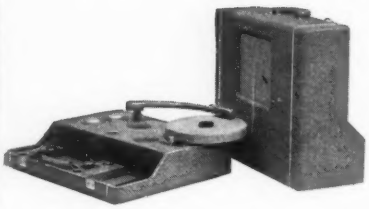
The Kalfax Microfilm Printer-Processor is a roll-to-roll printer that continuously unwinds, prints, develops and rewinds from any microfilm negative or positive original at the rate of 20 ft. per minute. A 100-ft. roll of original film is reproduced and ready for use in slightly over 5 minutes from the time the original is pulled from the file.

The *Proceedings* can be ordered from Dr. Vernon D. Tate, Executive Secretary, National Microfilm Association, P.O. Box 386, Annapolis, Md. Price: $7.50. —THE END

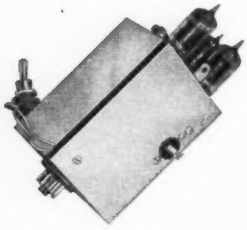
VICTOR-SOUNDVIEW



Start with remote control projector for silent programs . . .



Add phono for sound programs with manual film advance . . .



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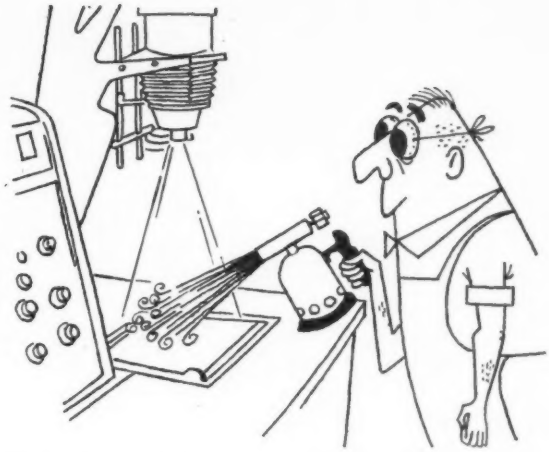

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by Samuel Lang & Leonard Zoref

INDUSTRIAL COLOR

35mm care, Ektachrome paper and benefits of Flexichrome process

Lately more than a few 35mm rolls have been coming through our place with fine scratches and other abrasions on the base side of the film. No single villain can be held responsible for these irksome defects (we say irksome because they usually have little effect on projection quality) but there are some common causes and simple remedies.

As you undoubtedly know, Ektachrome and Anscochrome are not provided with the protective backing which shields Kodachrome. The Kodachrome backing is effective, but machine methods are required to scour it off during processing. Anscochrome and Ektachrome were designed for processing without a fortune invested in equipment. Of course it's up to the photographer to practice extreme care to avoid scratching the film in the camera.

From there on in it's up to in-plant or outside processors to keep the surfaces of the film unmarred.

In the winter, when the humidity is low in most places in the U.S., 35mm color film can develop an ornery curl which invites scratches, whether handling is done by a photographer or by automatic equipment. We have two suggestions for counteracting this wintertime twist.

Immediately after drying the film pop it into a cabinet containing a simple vaporizer to humidify it. Another system is, after drying, wind the film onto a processing reel along with a strip of plain paper, after which the whole package is put into a refrigerator. A deep freeze is even more effective. Allow the film to cool down, take it out and let the moisture in the air condense on it. The film will absorb this moisture, and the problem child will become a model of deportment.

It seems to us that two excellent color systems deserve more attention than they're currently being given. We refer to Kodak's Flexichrome process and Ektachrome paper.

Ektachrome Print Paper

We experimented with Ektachrome Print Paper when it first came out several years ago and generally speaking, were quite pleased with the results. Color rendition seemed superior to acetate base prints. The whites were better also, due to the paper base being whiter than the acetate. Unfortunately there were some shortcomings—in resolu-

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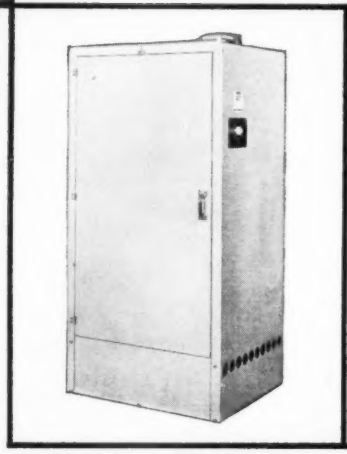

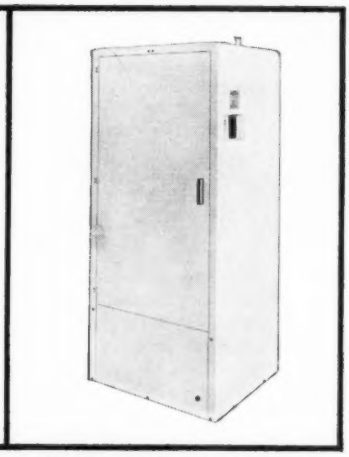

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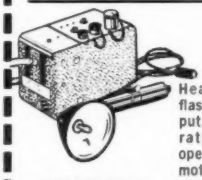

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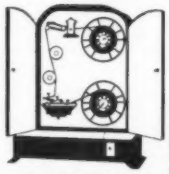

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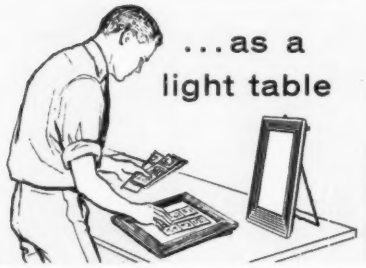

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tion and speed, for example—but they have been improved recently. The major drawback to Type "R" is that there is no good practical way of processing the paper in quantity except when in a continuous roll machine. Unfortunately the weave of Saran baskets leaves small screen patterns on the prints. Channel hangers are out of the question; as soon as the paper gets wet it expands and starts bulging out of the hangers. To complicate the problem further, the amount of expansion differs depending upon which direction the grain of the paper is running, and may vary from one box of paper to the other—even when both bear the same emulsion numbers. Clip hangers did not help at all. Even though we had all four clips mounted with spring steel, enough tension to keep the paper taut when wet would rip it. This eliminated all but continuous roll and tray processing, its only alternative. But processing difficulties aside, Ektachrome is an excellent material for prints from positive transparencies.

Flexichrome process

The Flexichrome process (rumored to be on its way out) has an emulsion almost identical to Dye Transfer Matrix film except, (1) it has added tooth to facilitate applying color by hand (2) it is made on a stripping base.

The film must be exposed through the base in order to form a relief image. Major objections to the process have stemmed from the fact that too many poor jobs were and are still being turned out by incompetent retouchers who do not have experience with it. When a Flexichrome is properly colored, it is difficult to distinguish it from a Dye Transfer.

Flexichrome is not a cure-all but it can be a life-saver. If color shots are needed but lighting or subject condition are too difficult for a good color transparency, the logical color process is Flexichrome. It scores in color accuracy too. Most hair rinse advertisements, for example, which show a complete line of colors are done this way, for by means of the Flexichrome process subtle color shade differences may be accurately and less expensively rendered.

Some of the ads use as many as 25 different shades. With standard color process, a model would have to be found and photographed for each color.

The process is much more difficult than it appears and requires quite a bit of patience as well as artistic know-how. The use of an air-brush improves results. —THE END

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AUDIO-VISUAL

Call Them Collect **201**
The Harwald Company, Inc. 32-page illustrated catalog, "Call Us Collect!" on audio-visual and film editing equipment. Includes prices.

Tackboard-Screen **202**
Tecler Aluminum Corp. 4-page folder tells of the Cine Tac Audio Visual Screen, projection screen and tackboard in one.

Slide, Filmstrip Cabinets **204**
Neumade Products Corp. 6-page folder describes five models of cabinets for slides and filmstrips.

Tecnifax Catalog **203**
Tecnifax Corp. 8-page catalog of overhead projectors, slide-making materials, supplies and equipment. Revised December, 1958. Includes prices.

Filmstrip File **205**
FilmKare Products Co. Catalog sheet illustrating the Filmstrip File Drawer system for storing and transporting filmstrips.

CAMERA & LENS

Oscilloscope Camera **210**
Fairchild Camera and Instrument Corp. Catalog sheet describes the Fairchild Polaroid Oscilloscope Camera.

View Camera Operation **249**
Burke & James, Inc. 32-page booklet describes the operation and uses of the Grover view camera.

Camera Catalog **207**
Hollywood Camera Co. 32-page catalog of professional still and motion picture cameras, lenses, films, processing equipment and accessories.

Akarex Cameras **209**
Akarex Corp. Price list on the Akarex 35mm cameras and accessories.

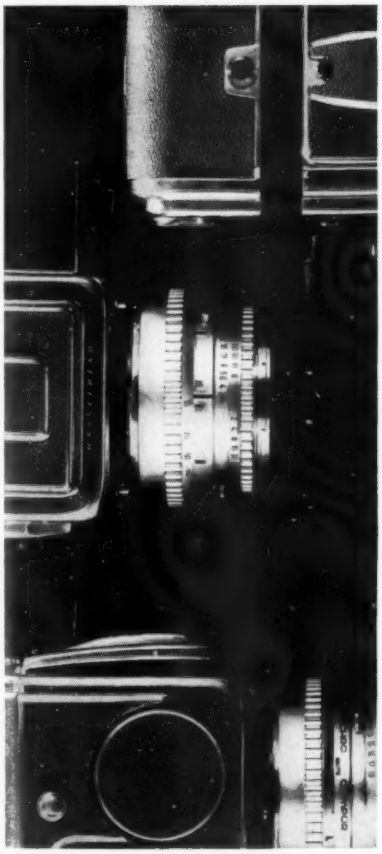
EQUIPMENT

Durst Masking Frame **219**
Argraph Co. 4-page folder describes the Durst 243 Masking Frame enlarging easel.

Quick Set Tripods **221**
Quick Set, Inc. folder and price list presents the Quick Set line of elevator tripods and accessories.

Color Response **220**
Nems-Clarke Co. 4-page reprint details studies of the color response of reversal color films when exposed to electronic flash; gives filter recommendations.

Bar-Ray Processors **215**
Bar-Ray Products, Inc. 15-page catalog and price list of stainless steel sinks, automatic film processors, temperature control and refrigeration equipment for



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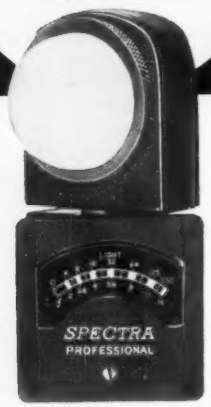

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It is especially designed for use in the motion picture, TV and professional photography field where instant direct reading and great accuracy is a prime requirement. The ultra sensitive SPECTRA professional exposure meter comes complete with disk, grid, 16 film-speed slides and carrying case $97.50

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black-and-white as well as color processing.

Gas Burst Agitation **223**
Lektra Laboratories, Inc. 4-page catalog sheet describes Lektra gaseous burst agitation equipment and accessories. Includes prices.

70mm Dryer **217**
Photostat Corp. Catalog sheet describes the Statfile Film Drier, table-model unit with a capacity of 100 ft. of 70mm film.

Film Magazine **216**
Harward Corp. Catalog sheet describes the Kinematic film magazine, with a capacity of 10 sheets of 4 x 5 film, for springback cameras.

Beseler Enlargers **214**
Charles Beseler Co. Folder contains specification and price sheets for eight Beseler enlargers and for enlarger accessories and darkroom equipment.

Close-up Photography **213**
Standard Camera Corp. 24-page instruction manual on macrophotography, microphotography and photomicrography with Praktina and Praktica cameras.

Processing Equipment **212**
Oscar Fisher Company, Inc. Pocket-sized, 40-page "Fisher Folio" describes the Fisher line of photographic laboratory equipment including sinks, trays, automatic and manual processing equipment, temperature control systems and laboratory design service.

Simplex Dryers **211**
Simplex Speciality Co. 8-page folder lists specifications of six industrial models of Simplex dryers.

GRAPHIC ARTS

Vertical Camera **225**
M. P. Goodkin Co. 4-page folder explains their D-Lux "18" vertical graphic arts camera.

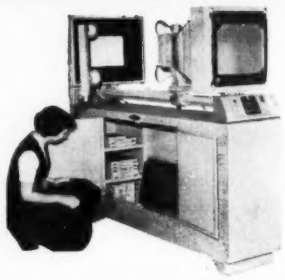
Kenro Vertical **250**
Kenro Graphics, Inc., 8-page booklet, price list describes the Kenro "Vertical 18" graphic arts camera.

MOTION PICTURES

Sound Readers **231**
Precision Laboratories. 6-page price list of optical and magnetic sound readers.

FilMagic Pylon **232**
The Distributor's Group, Inc. folder

New, low cost 11 x 14 CAMERA



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describes the FilMagic Pylon automatic silicone film lubricator that attaches to most popular 16mm projectors.

Tripods **226**
The Camera Mart Inc. Reprint tells of Camart Scout Hi-hat, panhead and motion picture tripods.

Processors **227**
Filmline Corp. 10 catalog sheets describe 16 and combination 16/35mm units for negative and reversal black-and-white film processing.

Editing Equipment **228**
Florman & Babb, Inc. catalog sheet describes rewinds, an optical-magnetic sound reader and synchronizers for 16 and 35mm films. Includes prices.

Titling Service **229**
Knight Title Service. Specimens of type available through this hot press title printing service.

Clean Film with Sound **230**
Lipsner Smith Corp. 16-page booklet presents a technical lecture by Robert Cutterman on the theory of ultrasonic film and magnetic tape cleaning; and the application of commercial devices using the principle.

Herrnfeld Catalog **234**
Frank Herrnfeld Engineering Corp. 22-page loose leaf illustrated catalog of professional 16mm and 35mm motion picture printing and sound reproduction equipment. Includes prices.

For your copy of any free literature item, circle the appropriate number on the readers' service card, page 65.

Studio for Rent **235**
Rolab Photo-Science Laboratories. 8-page booklet-price list explains this Connecticut firm's sound studio rental system.

Film Processing **240**
Film Labs Inc. 4-page rate card of industrial and professional motion picture film and processing.

16/35mm Processing **236**
Hollywood Film Enterprises, Inc. 2-page price list of 16mm and 35mm film processing and servicing. Plant cleared for handling classified material up to and including the "Secret" category.

35mm/16mm Process Camera **206**
The Animation Equipment Corp. 4-page

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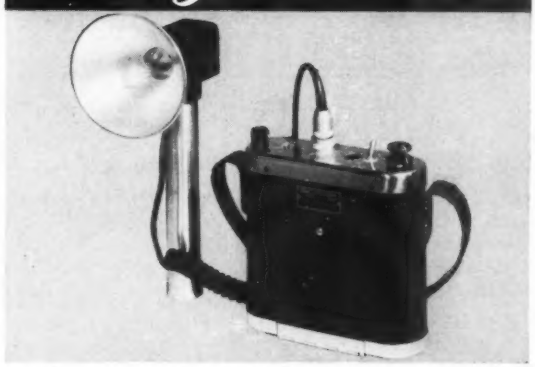

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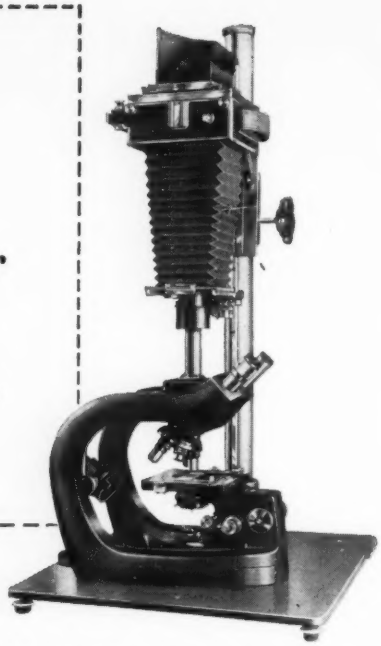

The photographic needs of the laboratory and the production line are as varied as they are exacting. One moment may call for a microphoto analysis of a lapped surface —another, for a progress study of a new machine installation — or the picture of an executive for publicity. There is no predicting what may be next. But, whatever it is, the camera must be able to cope with it efficiently.

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reprint discusses the Oxberry Combination 35mm/16mm camera for animation and optical printing.

SUPPLIES

Autophen Developer 248
Ilford, Inc. 6-page folder describes Autophen Developer, a long-life Phenidone-hydroquinone film developer for photofinishing.

Hunt Chemicals 247
Philip A. Hunt Co. 32-page price list of photographic and graphic arts chemicals.

Koh-I-Noor Photo Papers 245
Superfot Film Product Co. Sheet lists characteristics of this newly imported line of contact, enlarging and portrait papers.

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Using Grey Cards 243
Meisel Photochrome Corp. 4-page "Information Sheet No. 4" explains how to use grey cards in shooting color negatives.

Photo Books 242
Amphoto. 26-page catalog of photographic books.

Kodak Chemicals 241
Eastman Kodak Co. 12-page detailed price list of photographic chemical preparations.

SERVICES

Photomurals 238
Photomammoth Murals Kit shows how to measure wall space, illustrates murals available from stock and gives price per sq. ft. for murals from your own negatives.

Custom Prints 237
Leco Photo Service 18-page price list for custom roll film and sheet film processing, black-and-white and color.

Quality Color Prints 239
Abar Color Labs. 2 catalog sheets offer prices, instructions for ordering Ektacolor Prints from this Rhode Island color processor—as low as $1 per 8 x 10 in quantities of 100 or more.

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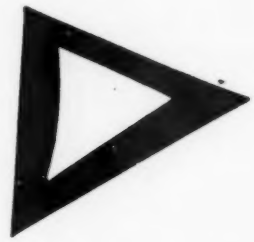

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NEW PRODUCTS

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Point Source Light **106**
The ColorTran Point Source Lite features automatic or manually operated timer, from 0 to 30 seconds, "infinite" intensity adjustment with large calibrated dial, adjustable telescopic snoot to restrict the area illuminated as desired, and a safety pilot light that shows when unit is ready for operation. The unit, which uses standard automotive light bulbs, is priced at $42.50.

Another Kodak PB Product
Contrast Process Ortho is now available on .010 polystyrene base. Specifically designed to provide a dimensionally stable material for preparation of Dultgen halftones in the gravure process, the new film is designated Kodak Contrast Process Ortho PB Film. The new film has the same photographic characteristics as the Kodak Contrast Process Ortho Plate. It is now available from Kodak Graphic Arts Dealers in size from 8 x 10 to 20 x 24 in.

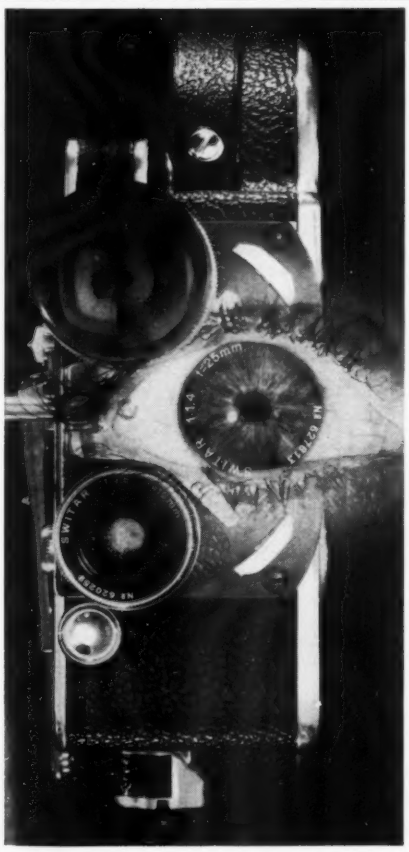
Outlet Box **117**
A heavy-duty four-way outlet box wired in No. 14 cable offered with the option of six different styles of outlet receptacles. It is made of metal covered with an insulating coat of oil resistant Neoprene rubber. The unit, made by Ericson Manufacturing Co., is available with 25 and 50-ft. lengths of cord, but may be ordered to any specific size. Prices from $11.50.

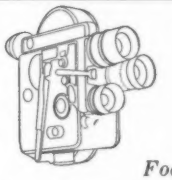
Flash Shield **118**
The Tiffen Flash-Pol is a three-sided shield that slips over flash reflectors. One side polarizes the light coming from the flashbulb, a second side is a blue conversion filter and the third side is clear to protect against shattering flashbulbs. The shield, available in three sizes, fits 3 to 7-in. diameter reflectors.

30 Magnifier **105**
A binocular-type magnifier described as having matched optical glass lenses, which are mounted in a plastic eyeshade with an adjustable headband, is the Magni-Focuser. Can be worn with or without regular eyeglasses. Manufactured by Edroy. Price: $10.50.

10 in. Telephoto Lens **164**
A 270, (approx. 10½ in.) f/5.6 telephoto lens for 4 x 5 press camera has been introduced by Graflex Inc. The lens, the Rodenstock Rotelar, is mounted in a No. 1 Graphic Synchro Compur 11-speed shutter, T, B, 1 to 1/400 sec.

Closeup Set **104**
A plus 3 parallax-correcting close-up set for twin-lens reflex cameras enables parallax-free close-ups down to 10 in., it is said. The Accura Close-up No. 3 set consists of a bayonet mount coated plus 3 lens and a matching lens coupled with





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16mm REFLEX

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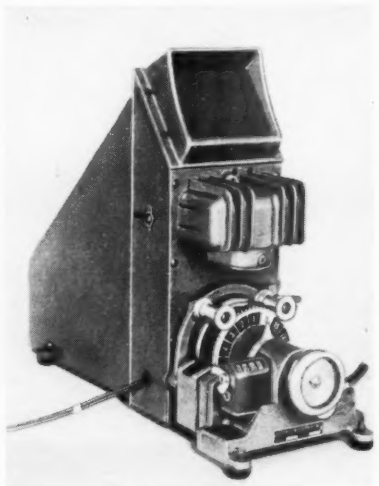
a prism which compensates for the differences in field of view between viewing and taking lenses. It covers a field from about 7 x 7 to 10 x 10 in. The set fits standard bayonet mount Yashica, Minolta, Rollei cameras. Price: $7.95.

35mm Viewer 103

Said to combine the functions of a viewer, synchronizer, footage counter, and frame counter, the Model NCE 35mm film picture viewer is now available. Additional 16mm or 35mm sprockets provide for double system editing. Soundheads for magnetic tape can be added to the additional sprockets for any number of magnetic tracks. The viewer can be adapted to a combination



viewer-synchronizer and assembled to the user's specific requirements. Image size is 3¼ x 4¼ in. A built-in air conditioning unit protects and maintains the film at even temperature so the picture can be stopped at will and viewed for periods of time without damaging the film, say manufacturers. A built-in shutter may be run continuously or operated for frame-by-frame editing. The viewer, manufactured by National Cine Equipment Inc., is priced at $595.

Remington Rand DTRs 101

Two new models of photocopy units, have been introduced by Remington Rand. The Star will accept originals up to 9¾ in. wide and of any length. The Mercury will accept originals up to 15 in. wide and of any length. Prices: $219.50 and $299.50.

Auto Sound Slidefilm Projector 114

A fully automatic filmstrip projector which changes pictures as quickly as 1/20 sec. without attention from the operator has been announced by Dukane Corp. Salient features of the Micromatic include record tone arm with a plug-in cartridge which has a built-in spare

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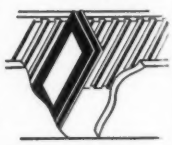

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needle, a printed circuit amplifier, and "stubby" lamp for improved cooling. The carrying case has a built-in shadow box screen. Dimensions are 6½ x 13⅜ x 15½ in.

Check for Radar Cameras 111

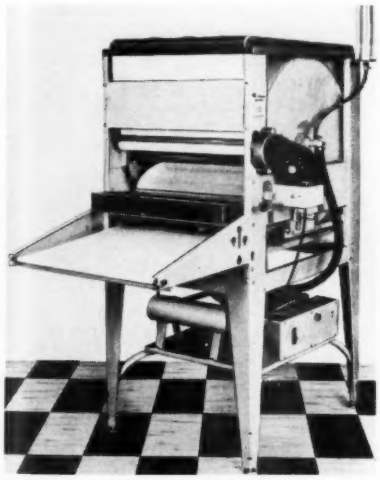
The Mast Development Co., Inc. Model 1001 High-Speed Spot Scanner is used to check shutter operation of the 0-15, 0-20, 0-23, 0-30, 0-32 and similar cameras used in radar recording systems. Shutter open and closed time periods can be read within .001 sec., directly from film exposures made of the High-Speed Spot Scanner's animated display.

A .020-in. diameter light spot rotates five times per second behind the transparent scale. The scale and the light path formed by the rotating light spot are simultaneously exposed on the film of the camera being tested at a speed of five fps.

The length of the path traced on any given frame of the film by the rotating light spot can be read along the scale as the shutter open time.

Print Dryer 112

The water-heated Pakonomy Dryer is electrically operated. Drum is chrome-plated stainless steel. A modification unit is available to permit roll print drying on this dryer.



Wallet Salesman 110

Color transparencies in microfilm apertures, plus a collapsible viewer that will enable salesmen to carry 100 or more "samples" in a wallet is the new Filmcard Vuedex sales system developed by Taylor Merchant Corp. A color transparency is mounted in a card aperture that occupies approximately 1/20 of a card face area, leaving the rest of the space on both sides for imprinting. The cards now being produced are the punched card, tabulating type by the Filmsort Company.

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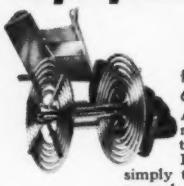

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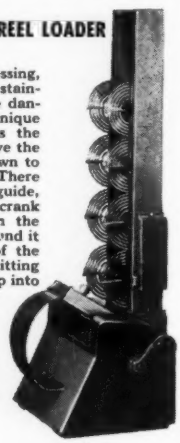

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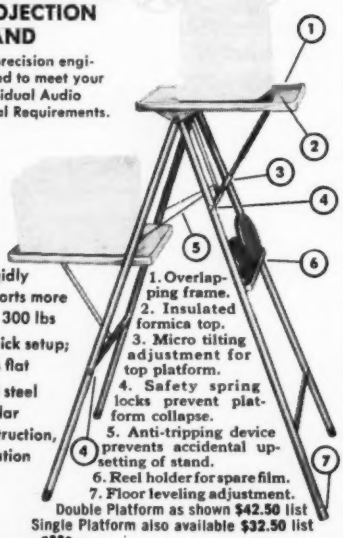

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IN-PLANT TEST

Beseler 45AF Autofocus Enlarger OKd by Resnick, tough WE lab man

SPECIFICATIONS: Beseler Model 45AF Autofocus Enlarger. Negative size, 16mm to 4 x 5. Focusing: autofocusing by parallelogram, wheel and cam system. Light source, 150-watt opal lamp. Construction: steel and extruded aluminum with pyramid structure and obelisk frame. Other features: single set of condensers for all lenses, concealed counterbalance for crank-controlled up and down movement; horizontal projection; glassless negative carriers and wheel mounted variable contrast paper filters. Manufacturer: Charles Beseler Co., East Orange, N. J. Price $495.

Harold Resnick, Western Electric Co., reports: I am a pretty severe judge of equipment, because our darkrooms here at Western Electric are carefully planned and our inventory reads like the Social Register of processing equipment.

Nevertheless, this new autofocus enlarger has features that could make my work a lot easier and quicker. Characteristics that particularly made me cheer were the one-condenser-for-all-lenses feature that is found on other Beseler enlargers, the fact that the negative could be rotated horizontally almost 360° without taking it out of the carrier, and the fact that, with a little ingenuity, reductions could be made with the apparatus as easily as enlargements.

To begin with, an autofocus enlarger is a tremendous convenience when the work comes in as it does at our place, requiring all kinds of cropping and very seldom two prints in succession at the same enlarger setting. The Beseler 45AF has a silky, sure action and you don't have to be an engineer to change cams (although on the one I tested you had to have the muscles of a stevedore to change lensboards). With an enlarger as adaptable as this one I am sure that a little practice would enable any experienced darkroom man to get into a routine of much

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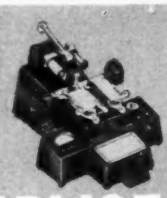

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faster operation than would be possible with any other type. After all, it is not absolutely necessary to switch lenses after every negative, and even if there is a stretch where every print seems to require a new focal length, the very efficient double-bellows system that eliminates changing condensers makes the process painless.

Reduction feature

One of the standing jobs we get in our darkroom is reduction of all negatives to 1¼ x 1⅝ prints for file purposes. Although we do have an enlarger capable of this, it is the biggest and most elaborate in the shop. It is not difficult to use, but the amount of room it takes up makes using it tie everything up. Our only alternative—not very efficient—is to use a smaller piece of equipment and build a Rube Goldberg under the enlarging easel to get it close enough to the lens. We've been doing this so long that we're used to it and it isn't until we come across a piece of equipment like the Beseler 45AF that we realize what a lot of time we could save with the right enlarger in the right place.

Comes the revolution

The next feature that appealed to me was the negative carrier that could be turned horizontally in the enlarger. This may not seem to be vital matter, but it's a lot simpler to turn the carrier than it is to get the framing you want by turning the easel. It's only because so few enlargers have a feature of this sort that its time saving and ease of operation aren't better known.

These advantages far outweigh design slip-ups I could mention, but just for the record there are a few things I'd like to see changed when the next version comes out. I'm not too crazy about the finish on the metal parts. I've seen this finish on much cheaper pieces of amateur equipment, and although it might be quite adequate for the job it's got to do, it doesn't look quite as though it's in a class with the mechanical parts of the enlarger.

No real bugs

The other thing that annoyed me was the hinged dust cover over the wheel that held the variable contrast filters. This may be necessary, but it does get in the way.

Outside of these two minor points there's just no place to fault the Beseler 45AF. It's a soundly designed enlarger, that does the job it's built to do and does it fast and well. Nobody could ask for more. Not much more, anyhow. —THE END

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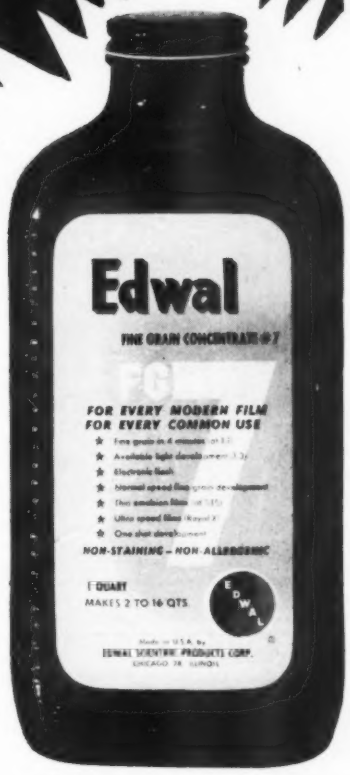

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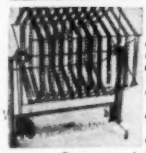

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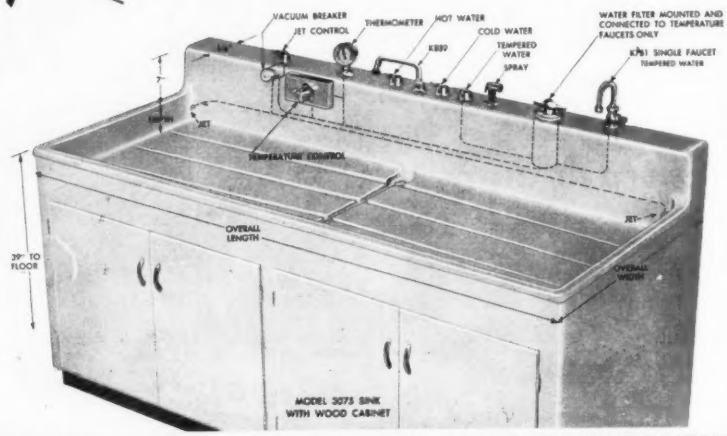

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ACCELERATED PROCESSING

(*continued from page* 35)

from the short persistence phosphors of a radar tube face, but they also provide a permanent record of events which is later available for close scrutiny.

Rapromatic

Another way to avoid spillage is incorporated in the system used in the Rapromatic S-P Processor, made by Specialties, Inc. A web—presaturated with the appropriate solution: developer, fixer or monobath —is brought into contact with the exposed emulsion. This arrangement completely does away with the need for solution chambers in the processor. Raproroll webs are vacuum sealed in containers to prevent oxidation and for easy storage.

Flash processing

Flash processing, used in the Datarite Magazine Processor (Consolidated Electrodynamics Corps.) for oscillographic recording is accomplished by applying a very thin layer of developer with a capillary feed slit to the emulsion side of the exposed recording paper, which is then passed over a heated platen. Heat accelerates development, dries the emulsion, and decomposes residual developer. Viewing after a wait of .8 sec. is possible when this unit is run at a maximum speed of 25 in. per sec. This rapid viewing time becomes especially useful in applications such as stress analysis of aircraft in flight testing, where it is essential to have information immediately.

P.O.P. system

Printing-out paper is used in another oscillographic recorder, the Minneapolis-Honeywell Visicorder. A high-pressure mercury vapor lamp serves as light source. Writing speeds with the unit go up to 160 in. per sec. The record may later be latensified, given a post-exposure to fluorescent light for improved image density.

Other systems

The electrostatic systems, Xerography and Electrofax, employ respectively (1) selenium-coated metal plate and (2) zinc oxide in a resin binder coated on paper. The material is first made sensitive to light by giving the surface an electrostatic charge. A pigmented resin powder which is dusted across the surface, adheres to those areas retaining a charge. For selenium-coated plates a sheet of paper is brought into contact and the pow-

der is transferred. Both systems use heat to fuse and fix the powder.

Electrolytic processes can also utilize the photoconductive properties of zince oxide. After exposure to the image an electrolytic solution containing a metallic salt is flowed or brushed across the surface of the material. Electrodes, one in contact with the metal undersurface, of the material, often aluminum,, another to the electrolyte, cause metal to plate out from the metallic salt in those areas struck by light.

Polaroid-Land, a diffusion-transfer-reversal process, employs a single solution which dissolves the unexposed silver halide from the light sensitive layer and redeposits it as metallic silver on a specially coated receiving sheet.

The video tape recording system translates a TV signal into a pattern on magnetic tape. For playback this sequence is reversed.

The Kalfax process employs photosensitive compounds dispersed in plastic. When exposed to ultra-violet light, these compounds are decomposed, and when heat is applied the plastic softens and light-scattering nitrogen bubbles are produced from the exposed photosensitive compounds, creating the image.

Complete processing systems can be rapid, simple and compact. It is inevitable that one of the future applications of such a device will be a darkroom in a man-made satellite for, say, processing close-up pictures of the moon, made for television transmission back to earth. Certainly a camera could be aimed by means of photoelectric sensors able to detect sharp differences in light level such as exist between the edge of the moon and empty space. These sensors could fix on three or four horizon points and thus orient a camera to focus on specific areas. Likewise sensors would trigger the exposures.

For the sake of compactness and high image quality, one of the slower-acting monobaths, applied as a paste or from a saturated web would probably be used. Film would be big as the space and weight limits would permit—probably beginning with 35 or 70 mm and ultimately 5-in. rolls, on thin-base to conserve space.

This is but one of the directions accelerated processing may take in the near future. Photographers can expect fast processing to get faster and better as this and other demands of technology get more and more stringent.—THE END

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INSTRUMENT

(*continued from page 53*)

Both of these methods are used to show movement in fluids. They show the change in density and therefore refractive index of a gas or liquid in motion.

Schlieren is the more sensitive of the two. A common test for alignment of the system is to place one's hand in field. If correctly aligned, waves of heat from the hand can be seen rising on the ground glass. But its adjustment is critical; it shows only the part of the field refracted above its knife edge, this field is limited in size by the diameter of a ground mirror, and the analytical method used with it is complex.

The direct shadow method is very simple. The field it can picture is limited by the size of the photographic film used. But it has the disadvantage of requiring close proximity to the subject.

Rohr Aircraft recently developed a direct shadow system using no optical elements—no lenses, no pinhole. The problem was to study the flow of gases leaving various test models of jet engine sound suppressor-thrust reverser devices. Since these gases would be flowing supersonically, short exposures were required to stop the motion sufficiently for clear resolution. The light source chosen was a high-voltage spark between tungsten electrodes, with a duration of about one microsecond.

It was determined in the laboratory that acceptable resolution is obtained by placing the spark 3 ft. on one side of the event, and the film 1 ft. on the other side. A frame was constructed to support a sheet of heat-absorbing glass, a sliding "shutter," and the 8 x 10 film holder.

In setting up this arrangement at a test stand, the field is determined by running lines from the spark gap to the four corners of the film. This field should include a part of the solid subject in silhouette for reference. For measurement purposes the field magnification is determined by the angles from the spark gap to the film corners.

Rohr's tests were run at night to avoid exposing the film to any light other than the spark during the moment the slide was up.

No telling where we will go from here. But there are people thinking up satellite cameras, and devices to receive their transmissions. In Russia too, no doubt. —THE END

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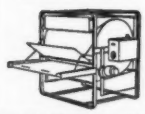

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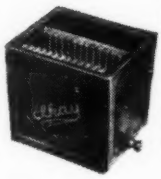

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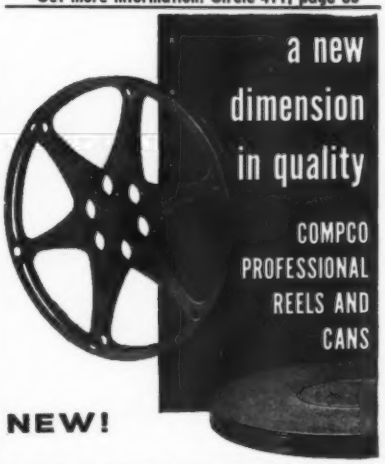

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